HC 16WK 2

PRIMER ON FRACTURES

COOPERATIVE COMMITTEE ON FRACTURES
AMERICAN MEDICAL ASSOCIATION

ILLUSTRATED

PRIMER ON FRACTURES

PREPARED BY THE

COOPERATIVE COMMITTEE on FRACTURES

UNDER AUSPICES OF

SECTION on SURGERY, GENERAL and ABDOMINAL

AND

SECTION on ORTHOPEDIC SURGERY

IN COOPERATION WITH

DEPARTMENT of SCIENTIFIC EXHIBIT

OF THE

AMERICAN MEDICAL ASSOCIATION

AMERICAN MEDICAL ASSOCIATION
535 NORTH DEARBORN STREET
CHICAGO

BOSTON MEDICAL LIBRARY
IN THE
FRANCIS A. COUNTWAY
LIBRARY OF MEDICINE

COPYRIGHT 1930
BY THE
AMERICAN MEDICAL ASSOCIATION

WE
180
A513c
1930

COOPERATIVE COMMITTEE ON FRACTURES

Nathaniel Allison, Boston, Mass., and Chicago, Ill. William Darrach, New York, N. Y.
Kellogg Speed, Chicago, Ill.

ADVISORY COMMITTEE ON FRACTURES

(Members who have served one or more years 1927-1930)

W. S. Baer, Baltimore, Md.
Joseph A. Blake, New York, N. Y.
Wallace Cole, St. Paul, Minn.
F. J. Cotton, Boston, Mass.
R. B. Dillehunt, Portland, Ore.
E. L. Eliason, Philadelphia, Pa.
W. L. Estes, Sr., Bethlehem, Pa.
M. L. Harris, Chicago, Ill.
George W. Hawley, Bridgeport, Conn.
M. S. Henderson, Rochester, Minn.
James M. Hitzrot, New York, N. Y.
W. L. Keller, Washington, D. C.
Frank N. Ober, Boston, Mass.
D. B. Phemister, Chicago, Ill.
Emmett Rixford, San Francisco, Calif.
Charles L. Scudder, Boston, Mass.
Wm. O'Neill Sherman, Pittsburgh, Pa.

DEMONSTRATORS

Among those who have assisted with the demonstrations at the annual meetings are the following:

Bertram S. Adams, Hibbing, Mont.
John Adams, Boston, Mass.
Otis F. Akin, Portland, Ore.
Louis W. Allard, Billings, Mont.
Arthur W. Allen, Boston, Mass.
R. L. Anderson, Richmond, Va.
Roger S. Anderson, Seattle, Wash.
Rodney F. Atsatt, Santa Barbara, Calif.
Harold D. Barnard, Los Angeles, Calif.
J. S. Barr, Boston, Mass.
George L. Barry, San Jose, Calif.
Peter A. Bendixen, Davenport, Ia.
R. Wallace Billington, Nashville, Tenn.
Sherman M. Burns, Oswego, N. Y.
Guy A. Caldwell, Shreveport, La.
Cyrus N. Callander, Fargo, N. D.
C. Latimer Callander, San Francisco, Calif.
Willis C. Campbell, Madison, Tenn.
Robt. Carothers, Cincinnati, Ohio.
William B. Carrell, Dallas, Texas
F. Walter Carruthers, Little Rock, Ark.
Carl C. Chatterton, St. Paul, Minn.
Isidore Cohn, New Orleans, La.
Wallace H. Cole, St. Paul, Minn.
A. N. Collins, Duluth, Minn.
Harold R. Conn, Akron, Ohio
Hugh E. Conwell, Fairfield, Ala.
G. K. Coonse, Columbia, Mo.
E. B. Cudney, Pontiac, Mich.
S. R. Cunningham, Oklahoma City, Okla.
Vernon C. David, Chicago, Ill.
Arthur G. Davis, Erie, Pa.
George G. Davis, Chicago, Ill.
B. I. Derauf, St. Paul, Minn.
George de Tarnowsky, Chicago, Ill.
Frank D. Dickson, Kansas City, Mo.
James A. Dickson, Cleveland, Ohio
Rexford L. Diveley, Kansas City, Mo.
Donald C. Durman, Saginaw, Mich.
Charles F. Eikenbary, Seattle, Wash.
P. J. Eisenberg, Milwaukee, Wis.
Eldridge L. Eliason, Philadelphia, Pa.
E. T. Evans, Minneapolis, Minn.
J. B. Foster, Houston, Texas
Clarence B. Francisco, Kansas City, Mo.
Joseph A. Freiburg, Cincinnati, Ohio
John H. Galbraith, Altoona, Pa.
A. E. Gallant, Los Angeles, Calif.
Charles C. Garr, Lexington, Ky.
John C. A. Gerster, New York, N. Y.
Paul W. Giessler, Minneapolis, Minn.
Donald Gordon, New York, N.. Y.
J. A. Green, Rockford, Ill.
Joseph M. Greer, Phoenix, Ariz.

Thomas R. Haig, Sacramento, Calif.
Roland Hammond, Providence, R. I.
William V. Healey, New York, N. Y.
Melvin S. Henderson, Rochester, Minn.
Myron O. Henry, Minneapolis, Minn.
Fred G. Hodgson, Atlanta, Ga.
Harry Jackson, Chicago, Ill.
Paul N. Jepson, Boston, Mass.
Fred A. Jostes, Columbia, Mo.
J. A. Judy, Dayton, Ohio
Roderick D. Kennedy, Globe, Ariz.
Frederick C. Kidner, Detroit, Mich.
Jennings M. King, Jr., Pittsburgh, Pa.
M. J. King, Wellsville, Ohio
Philip H. Kreuscher, Chicago, Ill.
Charles F. Kuhn, Detroit, Mich.
Philip Lewin, Chicago, Ill.
Alfred D. LaFerte, Detroit, Mich.
G. W. Leadbetter, Washington, D. C.
Andrew R. MacAusland, Boston, Mass.
Paul B. Magnuson, Chicago, Ill.
Henry C. Marble, Boston, Mass.
James W. Martin, Omaha, Nebr.
H. Page Mauck, Richmond, Va.
Charles R. McClure, Portland, Ore.
Golder L. McWhorter, Chicago, Ill.
H. W. Meyerding, Rochester, Minn.
O. L. Miller, Charlotte, N. C.
Robert A. Milliken, Indianapolis, Ind.
Eugene B. Mumford, Indianapolis, Ind.
E. Dunbar Newell, Chattanooga, Tenn.
Lloyd Noland, Fairfield, Ala.
Winnett H. Orr, Lincoln, Nebr.
W. B. Owen, Louisville, Ky.
E. Payne Palmer, Phoenix, Ariz.
C. W. Peabody, Detroit, Mich.
H. C. Pitkin, San Francisco, Calif.
W. J. Potts, Oak Park, Ill.
Eric Peet Quain, Bismarck, N. D.
W. W. Plummer, Buffalo, N. Y.
Warren R. Rainey, St. Louis, Mo.
Wells C. Reid, Goodrich, Mich.
Paul S. Richards, Bingham Canyon, Utah
Robert O. Ritter, Chicago, Ill.
S. M. Roberts, Boston, Mass.
M. H. Rogers, Boston, Mass.
E. W. Ryerson, Chicago, Ill.
E. T. Saeger, Boston, Mass.
Robert D. Schrock, Omaha, Nebr.
Herman C. Schumm, Milwaukee, Wis.
G. D. Scott, Sullivan, Ind.
Lemuel D. Smith, Milwaukee, Wis.
J. S. Speed, Memphis, Tenn.
Joseph E. Stewart, St. Louis, Mo.
Vernon P. Thompson, Los Angeles, Calif.
James E. M. Thomson, Lincoln, Nebr.
Augustus Thorndike, Jr., Boston, Mass.
D. R. Ulmer, Terre Haute, Ind.
S. B. Van Dalsam, San Jose, Calif.
Charles S. Venable, San Antonio, Texas
Jay D. Vyn, Grand Rapids, Mich.
John H. Wagner, Pittsburgh, Pa.
R. H. Walker, Charleston, W. Va.
James O. Wallace, Pittsburgh, Pa.
I. R. Watkins, Aberdeen, Wash.
R. C. Webb, Minneapolis, Minn.
Joseph W. White, Greenville, S. C.
Armitage Whitman, New York, N. Y.
De F. P. Willard, Philadelphia, Pa.
T. A. Willis, Cleveland, Ohio
E. Harlan Wilson, Columbus, Ohio
Philip D. Wilson, Boston, Mass.
W. Eugene Wolcott, Des Moines, Ia.
E. L. Young, Jr., Boston, Mass.

COMMITTEE ON SCIENTIFIC EXHIBIT

D. Chester Brown, Danbury, Conn., Chairman
Rock Sleyster, Wauwatosa, Wis.
J. H. J. Upham, Columbus, Ohio
Olin West, Secy. and General Manager
Paul Nicholas Leech, Director
Thomas G. Hull, Associate Director

FOREWORD

The subject of simple fractures has always been important to the practicing physician. In today's highly industrialized and automotive era, the incidence of fractures is increasing. With the advent of the roentgen-ray, the opportunity for correct treatment is generally recognized. The desire of the general physician for a review of the treatment of simple fractures appealed to the Committee on Scientific Exhibit of the American Medical Association.

In 1926, with the concurrence of the Board of Trustees, the proposal was made to the Section on Surgery, General and Abdominal and to the Section on Orthopedic Surgery for the appointment of a Cooperative Committee on Fractures, to present at the annual Scientific Exhibit demonstrations of proper handling of fracture cases. The Committee appointed by the sections included Dr. Nathaniel Allison, Boston, Mass., now of Chicago; Dr. William Darrach, New York and Dr. Kellogg Speed, Chicago.

For four consecutive sessions, the demonstrations of the treatment of fractures have been the center of an eager audience; usually seven booths were required. A large corps of physicians aided the general and advisory committees by giving demonstrations. The United States Army Medical Department generously cooperated by detailing soldiers on whom the demonstrations were made.

Each year there was prepared in advance an illustrated folder, depicting the booths and reproducing the legends which carried the important messages. These were distributed to those interested in the fracture exhibits. The demand for these folders from those who attended the demonstrations, from teachers in medical schools, and from others as well, has been so great that it was deemed advisable to assemble all of them under one cover as a "Primer on Fractures."

It is emphasized that the purpose of the Primer is not to standardize treatment of fractures; it is to suggest what, in the opinion of the Cooperative Committee on Fractures, constitute acceptable methods of treatment.

The Committee on Scientific Exhibit of the Board of Trustees of the American Medical Association expresses its grateful appreciation to Drs. Allison, Darrach and Speed and to all those who so ably assisted them for their valuable and altruistic labors.

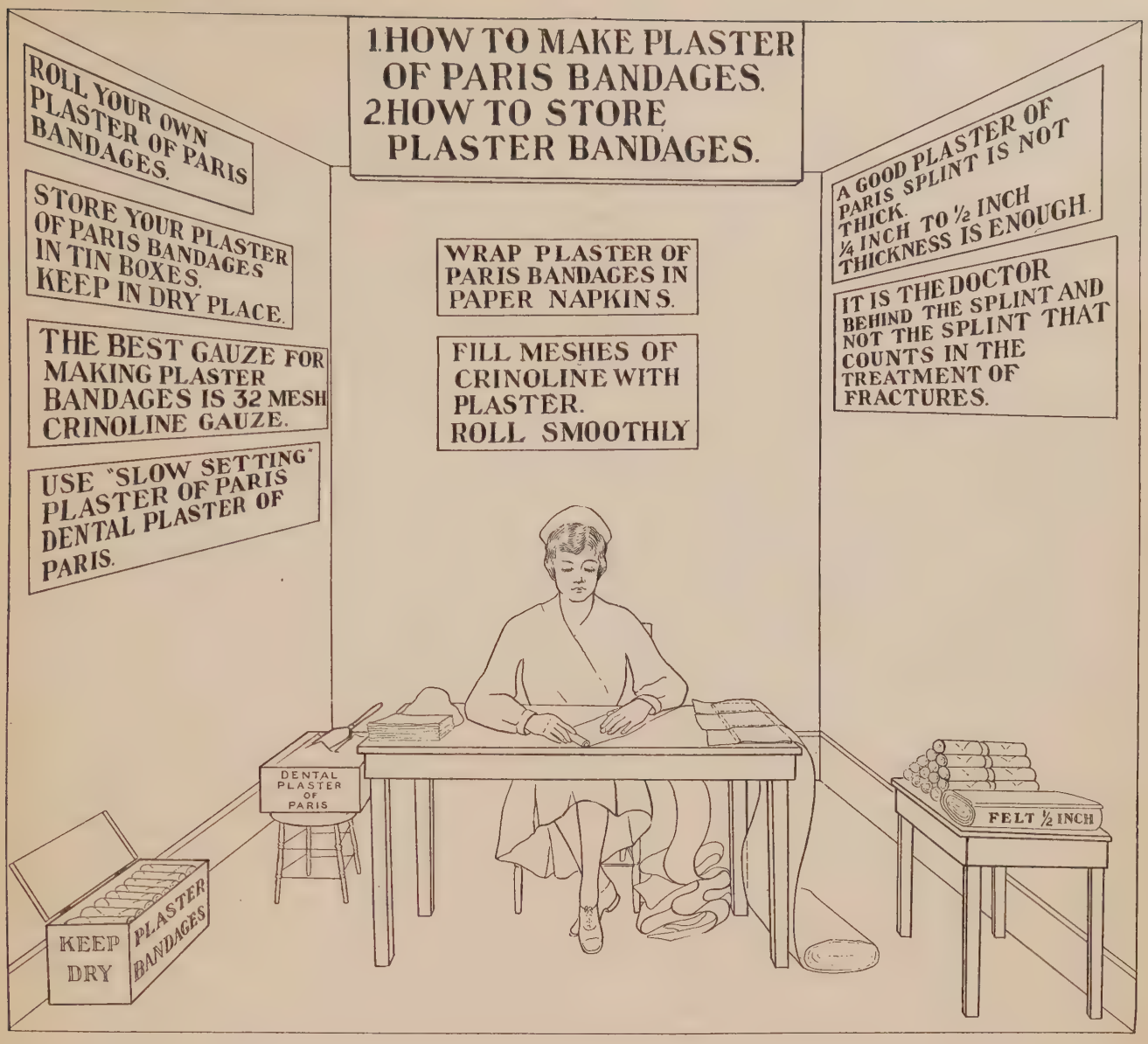
COMMITTEE ON SCIENTIFIC EXHIBIT.

September, 1930.

CONTENTS

	Page
1. How to Make Plaster-of-Paris Bandages	9
2. How to Apply Plaster-of-Paris Bandages	11
3. Fracture of the Hip: Neck of the Femur	13
4. Fracture of the Hip: Intertrochanteric Fracture of the Femur	17
5. Fracture of the Shaft of the Femur: Emergency Treatment	19
6. Fracture of the Shaft of the Femur: Bed Treatment	21
7. Fracture of the Lower Extremity: General Directions	23
8. Fracture of the Tibia and Fibula: Emergency Treatment	27
9. Fracture of the Tibia and Fibula: Bed Treatment	29
10. Fracture at the Ankle	31
11. Fracture of the Clavicle	35
12. Fracture at the Shoulder: Neck of Humerus	37
13. Fracture of the Humerus: Emergency Treatment	41
14. Fracture of the Humerus: Bed Treatment	43
15. Supracondylar Fracture of the Humerus	45
16. Fracture of the Scapula	47
17. Dislocation at the Shoulder	49
18. Fracture of the Radius, Distal End	53
Splints for the Doctor's Automobile	55
Splints for the Doctor's Office	55

NOTES


1.HOW TO MAKE PLASTER OF PARIS BANDAGES.
2.HOW TO STORE PLASTER BANDAGES.
ROLL YOUR OWN PLASTER OF PARIS BANDAGES.
STORE YOUR PLASTER OF PARIS BANDAGES IN TIN BOXES. KEEP IN DRY PLACE.
THE BEST GAUZE FOR MAKING PLASTER BANDAGES IS 32 MESH CRINOLINE GAUZE.
USE "SLOW SETTING" PLASTER OF PARIS DENTAL PLASTER OF PARIS.
WRAP PLASTER OF PARIS BANDAGES IN PAPER NAPKINS.
FILL MESHES OF CRINOLINE WITH PLASTER. ROLL SMOOTHLY
A GOOD PLASTER OF PARIS SPLINT IS NOT THICK. ¼ INCH TO ½ INCH THICKNESS IS ENOUGH.
IT IS THE DOCTOR BEHIND THE SPLINT AND NOT THE SPLINT THAT COUNTS IN THE TREATMENT OF FRACTURES.
DENTAL PLASTER OF PARIS
KEEP DRY
PLASTER BANDAGES
FELT ½ INCH

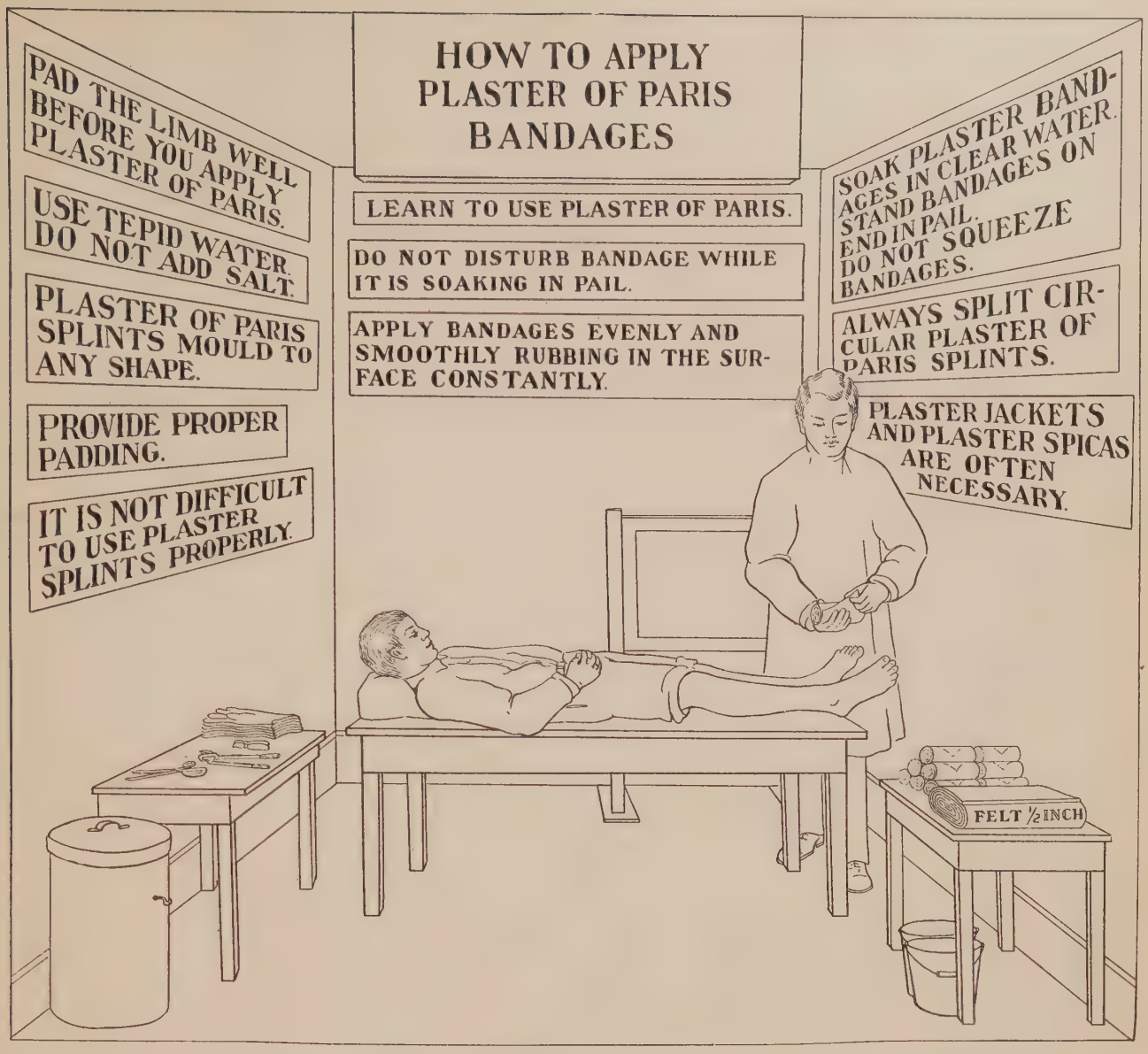
HOW TO MAKE PLASTER-OF-PARIS BANDAGES

Office and hospital home-made plaster-of-paris bandages are cheapest and best.

Buy 32 mesh crinoline gauze, tear it into 5 yard lengths, 2, 4 and 6 inches wide. Pull out three or more threads from each edge of the crinoline. Lay it on a table, fill meshes with plaster-of-paris of slow or average setting time. Roll up the bandage by hand evenly and not too tightly.

At least one week's advance supply should be made. Wrap the plaster bandages in paper napkins, folding the ends over and holding with a rubber band. Pack them in any dry receptacle as, for instance, a tin bread box, with a snugly fitting lid. Plaster bandages thus made and packed will keep fit for use for many weeks.

NOTES

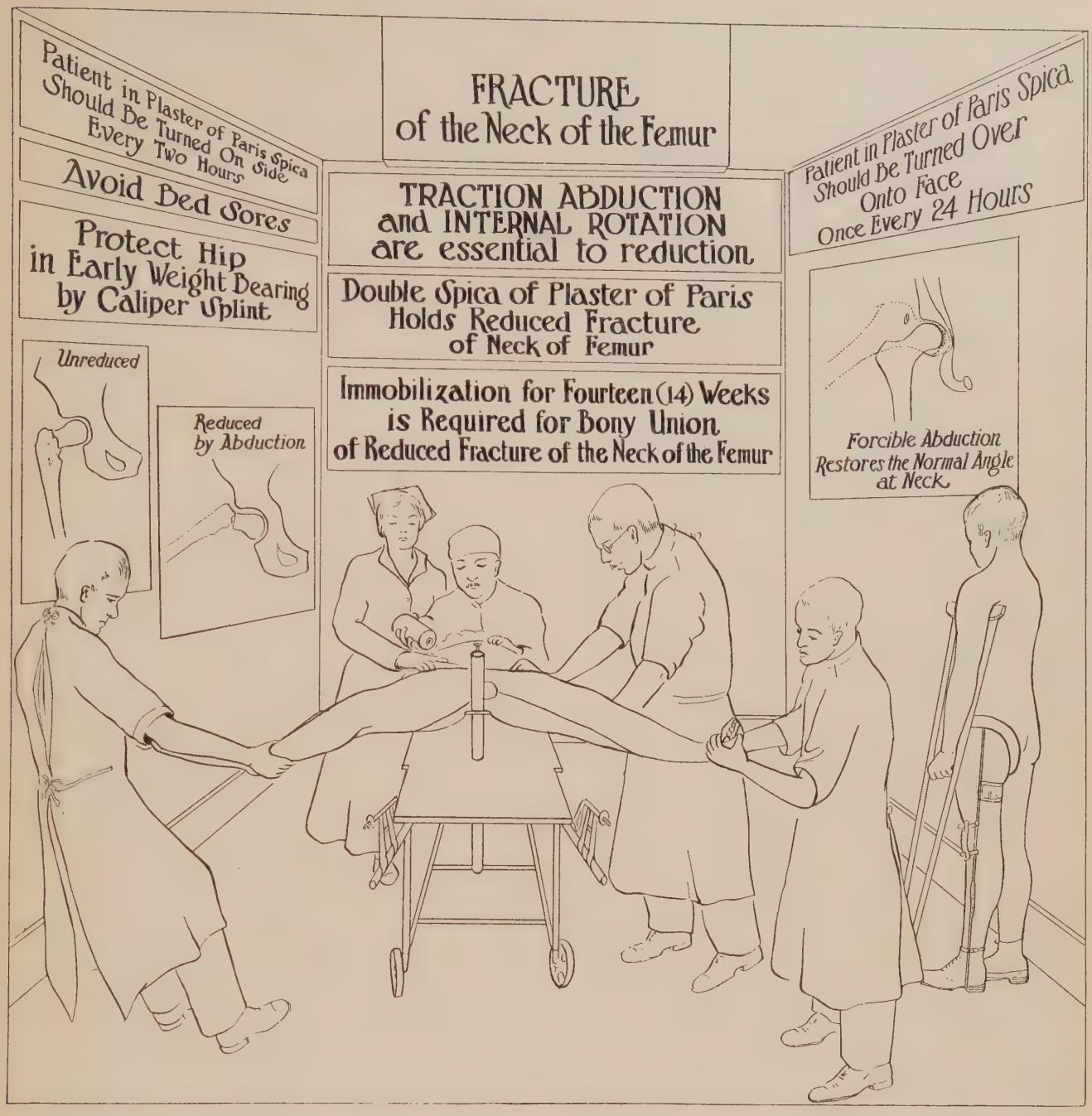

HOW TO APPLY PLASTER OF PARIS BANDAGES
LEARN TO USE PLASTER OF PARIS.
DO NOT DISTURB BANDAGE WHILE IT IS SOAKING IN PAIL.
APPLY BANDAGES EVENLY AND SMOOTHLY RUBBING IN THE SURFACE CONSTANTLY.
PAD THE LIMB WELL BEFORE YOU APPLY PLASTER OF PARIS.
USE TEPID WATER. DO NOT ADD SALT.
PLASTER OF PARIS SPLINTS MOULD TO ANY SHAPE.
PROVIDE PROPER PADDING.
IT IS NOT DIFFICULT TO USE PLASTER SPLINTS PROPERLY.
SOAK PLASTER BANDAGES IN CLEAR WATER. STAND BANDAGES ON END IN PAIL. DO NOT SQUEEZE BANDAGES.
ALWAYS SPLIT CIRCULAR PLASTER OF PARIS SPLINTS.
PLASTER JACKETS AND PLASTER SPICAS ARE OFTEN NECESSARY.
FELT ½ INCH

HOW TO APPLY PLASTER-OF-PARIS BANDAGES

Plaster-of-paris bandages can be made to fit a part of the body of any shape or size. Learn to use them without disturbing position of bone fragments. After removing the paper napkin cover, place the plaster bandage end up in a pail of tepid water, deep enough to cover it. Do not handle or squeeze soaking bandages. When air bubbles cease to rise from the submerged plaster bandage, it is ready for use. Grasp it in two hands and compress gently to remove excess water but to retain plaster.

Apply the plaster bandage by unrolling around the properly prepared and padded part, or make molded splints of suitable size on a table and bandage on immediately while soft. Apply the plaster bandage evenly without reversing, rubbing the layers smoothly on the surface. Reinforce weak points in circular splints with molded plaster bandages; not with any other material. Do not make the plaster dressing too thick; one-fourth inch is usually sufficient. Split circular plaster-of-paris splints to allow for swelling.

NOTES


FRACTURE
of the Neck of the Femur
Patient in Plaster of Paris Spica Should Be Turned On Side Every Two Hours
Avoid Bed Sores
Protect Hip in Early Weight Bearing by Caliper Splint
TRACTION ABDUCTION and INTERNAL ROTATION are essential to reduction
Double Spica of Plaster of Paris Holds Reduced Fracture of Neck of Femur
Immobilization for Fourteen (14) Weeks is Required for Bony Union of Reduced Fracture of the Neck of the Femur
Patient in Plaster of Paris Spica Should Be Turned Over Onto Face Once Every 24 Hours
Unreduced
Reduced by Abduction
Forcible Abduction Restores the Normal Angle at Neck

FRACTURE OF THE NECK OF THE FEMUR

The outstanding feature of fractures of the neck of the femur is the high percentage of permanent disability and large mortality. Most of the patients are over 50 years of age. The condition also occurs in children frequently as an epiphyseal separation. The best results are seen where the displacement of fragments is least. Do not cause displacement by careless examination. Whenever a hip injury is suspected, avoid any unnecessary movement until roentgen examination has demonstrated the diagnosis.

All treatment has for its object the reestablishment of bony union in the neck of the femur. This desired result may be accomplished by careful and systematic treatment in only too small a proportion of cases. There is a high percentage of cases which result in nonunion or painful fibrous union in spite of all treatment. In these instances it may be assumed that the circulation in the head fragment has been so damaged by the trauma, that the head will die or fail to unite.

NOTES

FRACTURE OF THE NECK OF THE FEMUR, *Continued*

The great misfortune in fracture of the femoral neck is the danger of nonunion, the years of disability, and confinement to bed during periods of treatment with final nonunion as a result. All treatment should seek to minimize these dangers. The essentials of treatment to be carried out are restoration of the femoral angle at the neck by abduction with bony contact, rest and protection for a sufficient period to favor body union, and delay in weight bearing even with protection by a brace. There is no short cut to a happy result. There are several methods of treatment:

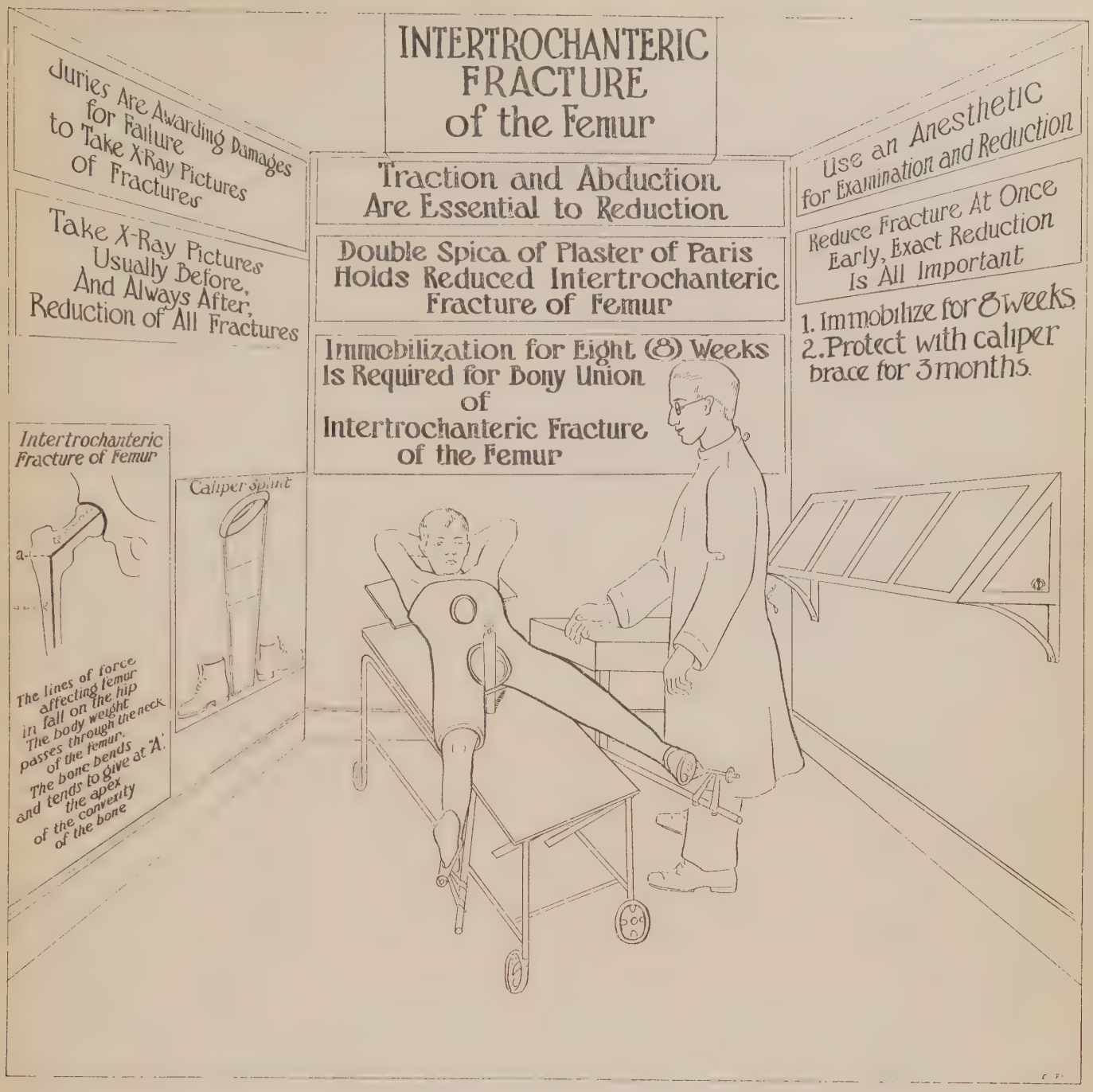
Abduction in plaster—Whitman's spica.

Traction and suspension in abduction.

Early operative intervention with the use of nails, screws and pegs.

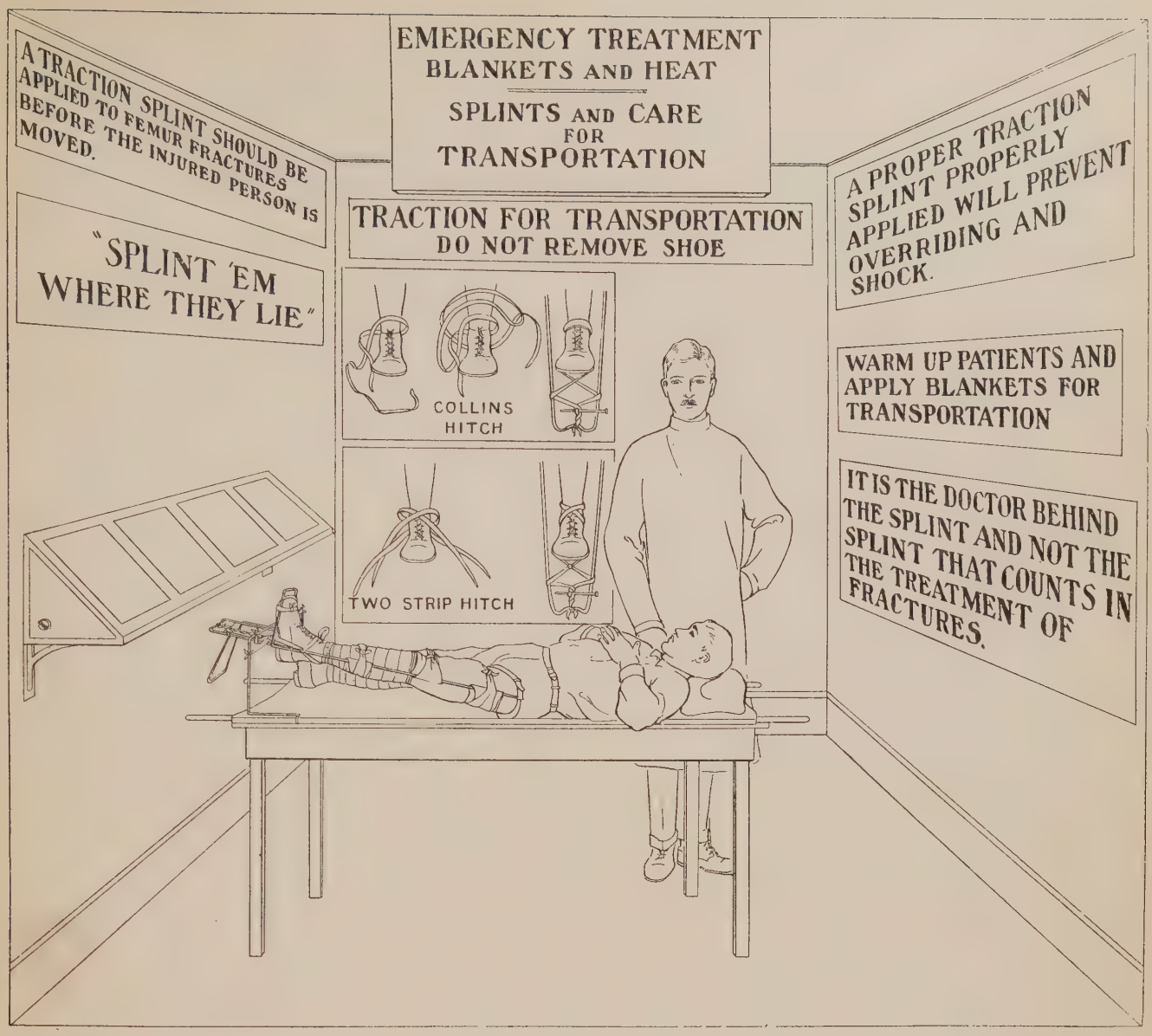
The success of all these methods depends on the process of bone repair in the neck, which requires a long period of protection. Unfortunately, this fracture is commonest in the worst possible type of patient, old women and men. Any displacement must be reduced, if possible. This can often be accomplished by traction with inversion followed by marked abduction of the thigh. This position must be maintained for at least fourteen weeks or more. Be guided by roentgenographic evidence of local bone healing progress. Additional protection by brace and crutches must be provided for many months lest the deformity recur from absorption, death of the head, or lack of solid bone formation.

NOTES


INTERTROCHANTERIC FRACTURE of the Femur
Juries Are Awarding Damages for Failure to Take X-Ray Pictures of Fractures
Take X-Ray Pictures Usually Before, And Always After, Reduction of All Fractures
Traction and Abduction Are Essential to Reduction
Double Spica of Plaster of Paris Holds Reduced Intertrochanteric Fracture of Femur
Immobilization for Eight (8) Weeks Is Required for Bony Union of Intertrochanteric Fracture of the Femur
Use an Anesthetic for Examination and Reduction
Reduce Fracture At Once Early, Exact Reduction Is All Important
1. Immobilize for 8 weeks
2. Protect with caliper brace for 3 months.
Intertrochanteric Fracture of Femur
a
Caliper Splint
The lines of force affecting femur in fall on the hip
The body weight passes through the neck of the femur.
The bone bends and tends to give at "A."
the apex of the convexity of the bone

INTERTROCHANTERIC FRACTURE OF THE FEMUR

If one must break the femur at its upper end, one will be exceedingly fortunate to obtain an intertrochanteric fracture rather than an intracapsular break. The line of fracture will run from the greater trochanter to the lesser trochanter diagonally across the base of the femoral neck. This fracture occurs in men twice as frequently as in women. The average age of patients is about 64 years. The cause is a fall on the side of the hip, striking the great trochanter. The fracture may be impacted or unimpacted. The physical signs are those of hip fracture. The roentgenogram will reveal the type of fracture. Treatment is simple in this group by means of a plaster-of-paris spica for eight weeks. It is essential to reduce the fracture under an anesthetic; after reduction, use traction suspension or apply a double plaster-of-paris spica, avoiding outward rotation of the femur, and have the patient recumbent for eight weeks. Almost all patients who do not succumb to intercurrent disease or old age gain bony union after intertrochanteric fracture of the femur. There is usually a small amount of shortening—from one-fourth to three-fourths inch. After eight weeks, patients are allowed to walk with crutches, wearing a brace for three months.

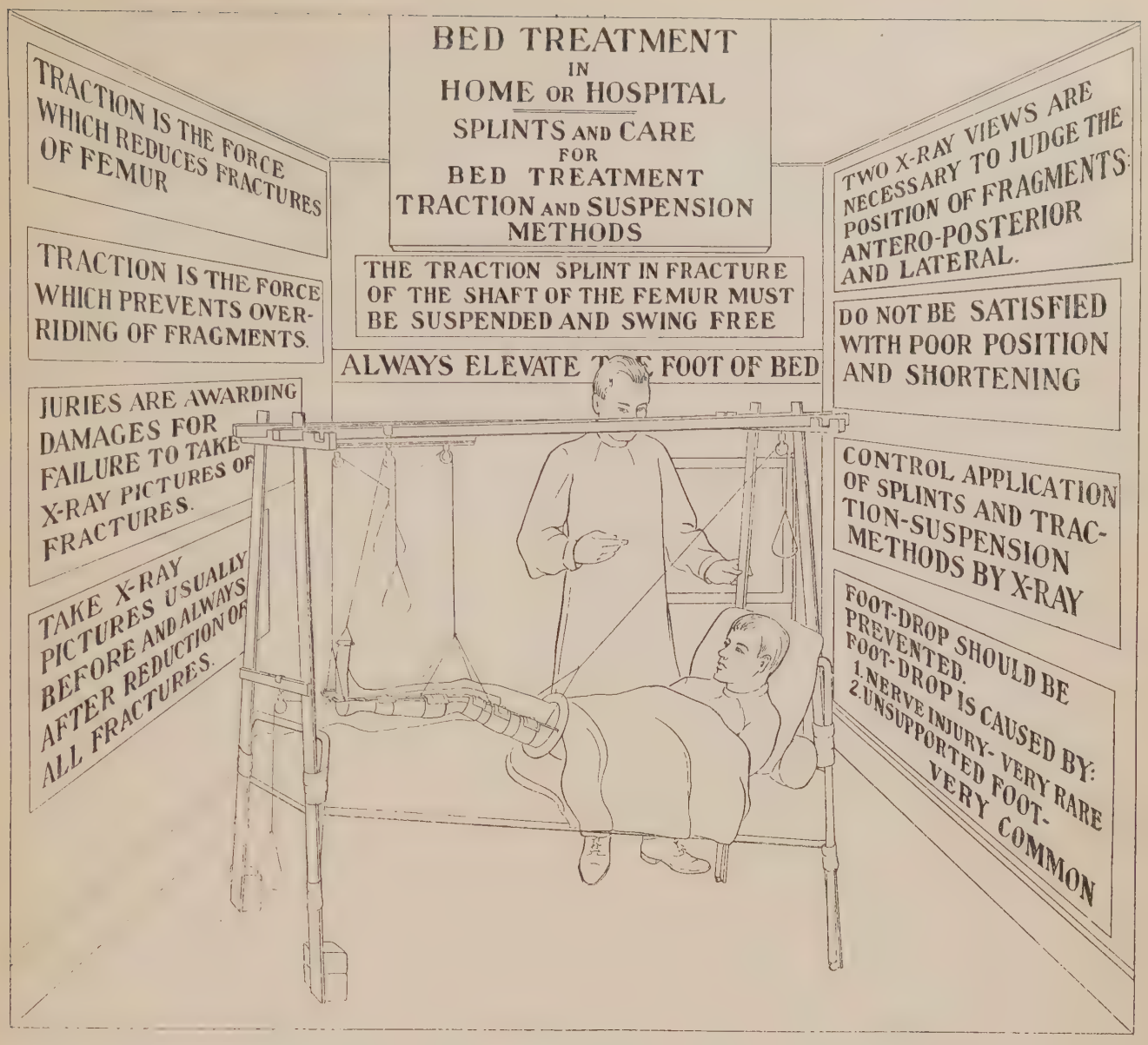

EMERGENCY TREATMENT
BLANKETS AND HEAT
SPLINTS AND CARE FOR TRANSPORTATION
A TRACTION SPLINT SHOULD BE APPLIED TO FEMUR FRACTURES BEFORE THE INJURED PERSON IS MOVED.
"SPLINT 'EM WHERE THEY LIE"
TRACTION FOR TRANSPORTATION
DO NOT REMOVE SHOE
COLLINS HITCH
TWO STRIP HITCH
A PROPER TRACTION SPLINT PROPERLY APPLIED WILL PREVENT OVERRIDING AND SHOCK.
WARM UP PATIENTS AND APPLY BLANKETS FOR TRANSPORTATION
IT IS THE DOCTOR BEHIND THE SPLINT AND NOT THE SPLINT THAT COUNTS IN THE TREATMENT OF FRACTURES.

FRACTURE OF SHAFT OF FEMUR

Emergency Treatment

Treat fracture of the shaft of the femur immediately on seeing it. "Splint 'em where they lie." A Thomas splint outfit can be carried in the physician's automobile. Do not remove the patient's clothing or shoe but apply a hitch round the ankle with a piece of bandage and fasten the leg gently and firmly in a leg traction splint or to a suitable piece of wood without disturbing the thigh more than to straighten it out. A traction thus applied early prevents shock and overriding of fragments. Keep the patient warm with blankets and obtain transportation to hospital or home. If the fracture is open, apply a sterile dressing. The most important point in the treatment of fractures is the understanding by the physician behind the splint, not the splint itself.

NOTES

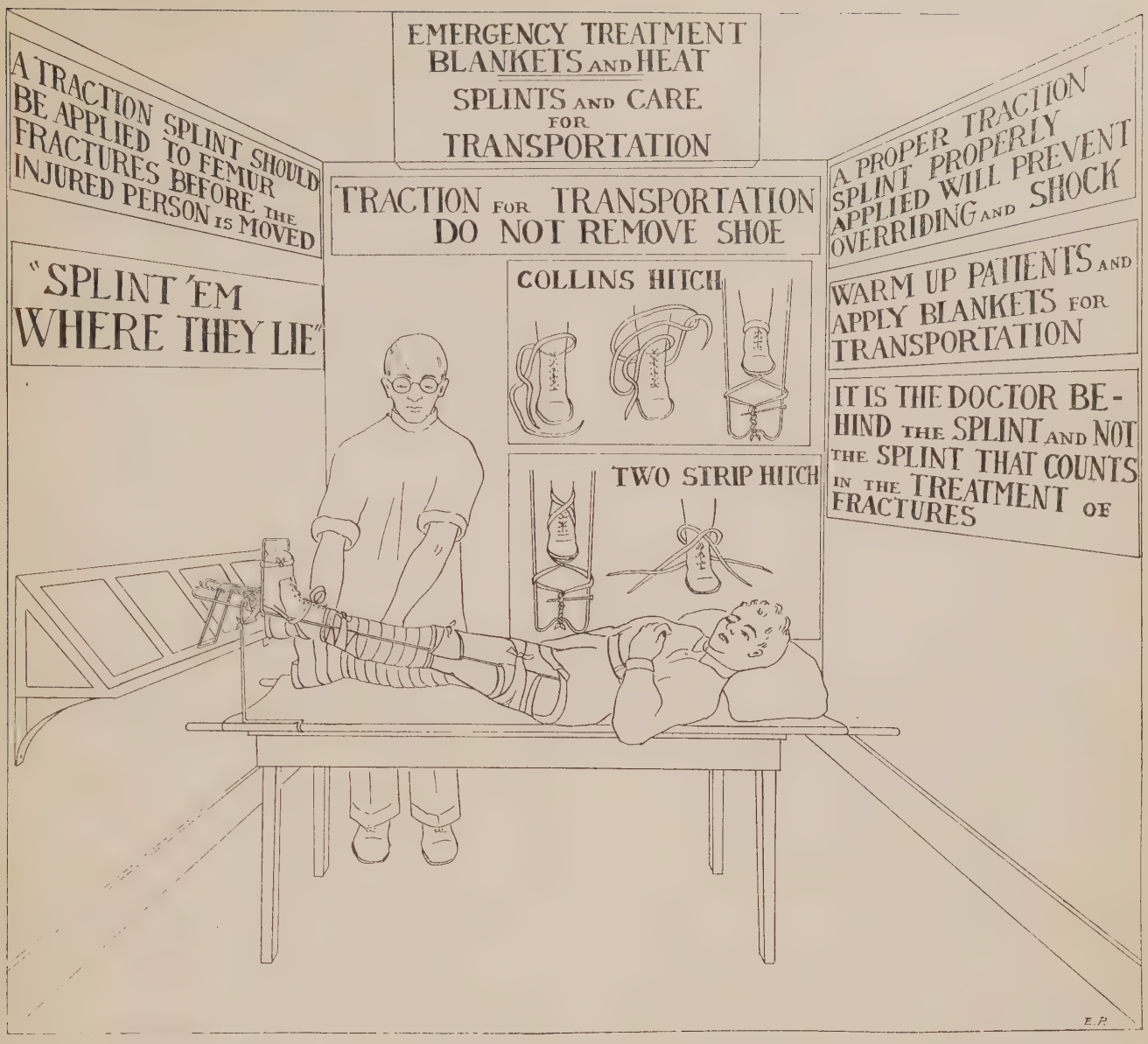

BED TREATMENT
IN
HOME OR HOSPITAL
SPLINTS AND CARE
FOR
BED TREATMENT
TRACTION AND SUSPENSION
METHODS
TRACTION IS THE FORCE WHICH REDUCES FRACTURES OF FEMUR
TRACTION IS THE FORCE WHICH PREVENTS OVER-RIDING OF FRAGMENTS.
THE TRACTION SPLINT IN FRACTURE OF THE SHAFT OF THE FEMUR MUST BE SUSPENDED AND SWING FREE
ALWAYS ELEVATE THE FOOT OF BED
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES.
TAKE X-RAY PICTURES USUALLY BEFORE AND ALWAYS AFTER REDUCTION OF ALL FRACTURES.
TWO X-RAY VIEWS ARE NECESSARY TO JUDGE THE POSITION OF FRAGMENTS: ANTERO-POSTERIOR AND LATERAL.
DO NOT BE SATISFIED WITH POOR POSITION AND SHORTENING
CONTROL APPLICATION OF SPLINTS AND TRACTION-SUSPENSION METHODS BY X-RAY
FOOT-DROP SHOULD BE PREVENTED.
FOOT-DROP IS CAUSED BY:
1. NERVE INJURY- VERY RARE
2. UNSUPPORTED FOOT- VERY COMMON

FRACTURE OF SHAFT OF FEMUR

Bed Treatment

All bed treatment at home or in the hospital must be directed as permanent treatment. The diagnosis must be confirmed as soon as convenient by roentgenograms taken in two planes if possible. The best and simplest means to reduce the displacement of fragments in shaft fractures is continuous traction on the leg. To apply traction, use adhesive tape along the side of the leg wrapped on by a bandage. The adhesive ends are fastened to a wooden block and the limb is held in a leg splint by cross slings. To obtain maximum traction with comfort, suspend the leg in the splint and elevate the foot of the bed to gain countertraction from the weight of the patient's body. The amount of extension required can be gaged by roentgen films showing the change in position of fragments. Don't let the thigh sag; prevent foot drop by holding the foot up at right angles to the leg and encouraging motions at the ankle. When traction fails to obtain reduction within three days, do not hesitate to have consultation.

NOTES


EMERGENCY TREATMENT
BLANKETS AND HEAT
SPLINTS AND CARE
FOR
TRANSPORTATION
A TRACTION SPLINT SHOULD BE APPLIED TO FEMUR FRACTURES BEFORE THE INJURED PERSON IS MOVED
"SPLINT 'EM WHERE THEY LIE"
TRACTION FOR TRANSPORTATION DO NOT REMOVE SHOE
COLLINS HITCH
TWO STRIP HITCH
A PROPER TRACTION SPLINT PROPERLY APPLIED WILL PREVENT OVERRIDING AND SHOCK
WARM UP PATIENTS AND APPLY BLANKETS FOR TRANSPORTATION
IT IS THE DOCTOR BEHIND THE SPLINT AND NOT THE SPLINT THAT COUNTS IN THE TREATMENT OF FRACTURES

EMERGENCY TREATMENT OF FRACTURES OF THE LOWER EXTREMITY

Better results will be secured in fractures of the lower extremity when it is generally realized that early splintage and application of traction will lessen deformity, decrease shock, and make early and complete reduction of fragments much easier to accomplish. The fault today in emergency treatment is not that it is not well done but that it is not done soon enough. Usually the patient's home or the hospital is the first aid post. The injured person is picked up and transported to home or hospital without regard to the fracture. Of course, this must be done because there is no provision as a rule for proper first aid treatment. It is a common experience to see a person with a fracture of the femoral shaft arrive at the admission ward of a hospital with from 2 to 4 inches of overriding of fragments. This is proved to be unnecessary by the few patients who arrive in a Thomas splint. Some intelligent physician arranged this before the patient is picked up and with the result that there is no pain, no overriding of fragments, and much less surgical shock. There was ample evidence of the advantage of early splintage and traction gained on the fields of France in the great war. We feel that argument is unnecessary.

What shall we do to better results of emergency treatment? Get ambulances to carry proper fracture appliances for transportation of arm and leg fractures. Give

NOTES

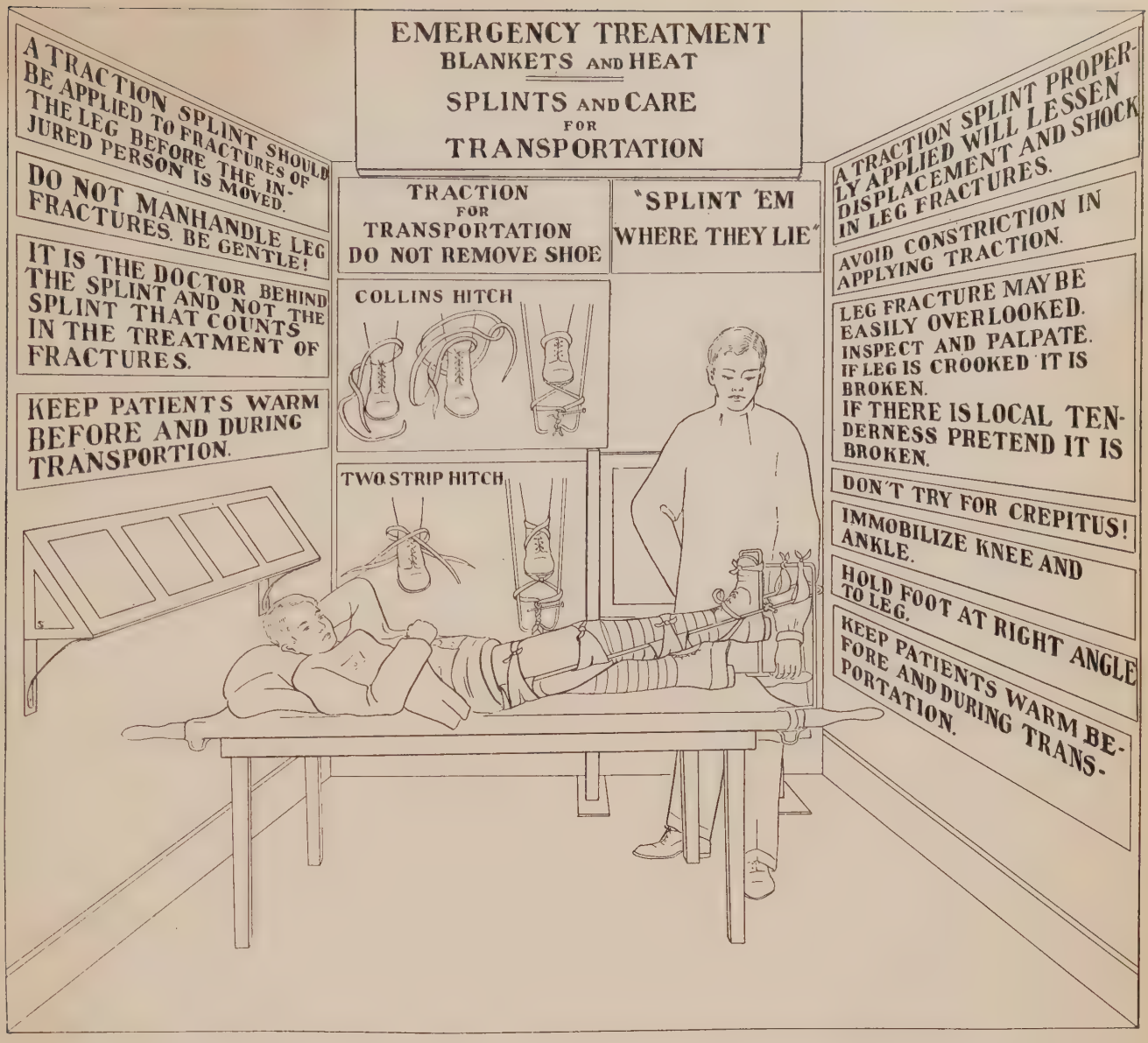
instructions to ambulance drivers how to apply these splints and how to blanket the patient.

It is possible that automobile clubs will help in these matters if properly approached and instructed. Physicians themselves should learn these simple tasks. They should also carry in their cars an emergency fracture equipment. One never knows when such an equipment might be worth a great deal in these days of increasing rapid transit methods, airplanes and automobiles.

Our creed is simple: "Splint 'em where they lie."

Warm them up, blanket them, and transport them safely to a proper place to undertake final revision of the fracture.

NOTES

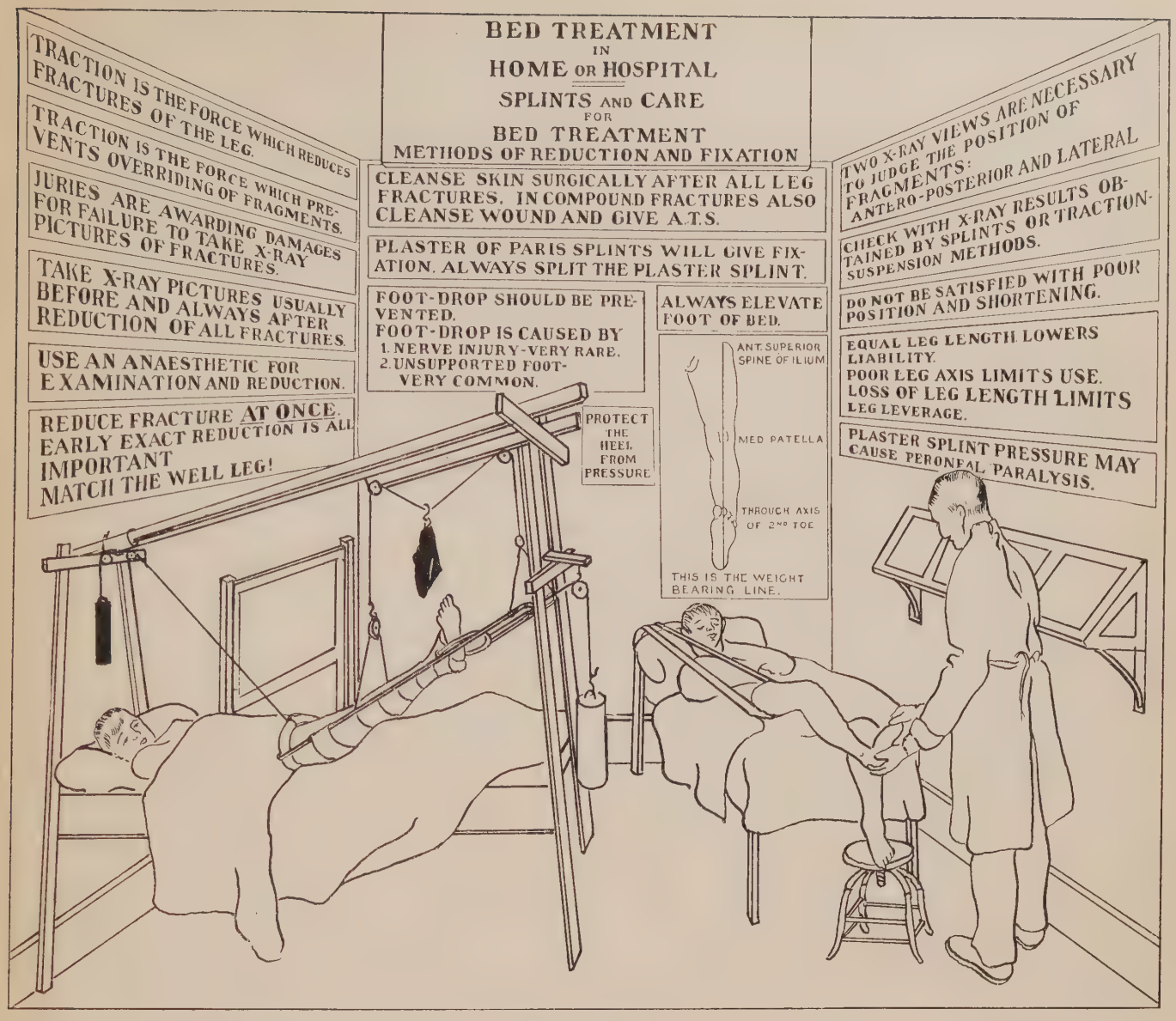

EMERGENCY TREATMENT
BLANKETS AND HEAT
SPLINTS AND CARE
FOR
TRANSPORTATION
A TRACTION SPLINT SHOULD BE APPLIED TO FRACTURES OF THE LEG BEFORE THE INJURED PERSON IS MOVED.
DO NOT MANHANDLE LEG FRACTURES. BE GENTLE!
IT IS THE DOCTOR BEHIND THE SPLINT AND NOT THE SPLINT THAT COUNTS IN THE TREATMENT OF FRACTURES.
KEEP PATIENTS WARM BEFORE AND DURING TRANSPORTION.
TRACTION FOR TRANSPORTATION DO NOT REMOVE SHOE
"SPLINT 'EM WHERE THEY LIE"
COLLINS HITCH
TWO STRIP HITCH
A TRACTION SPLINT PROPERLY APPLIED WILL LESSEN DISPLACEMENT AND SHOCK IN LEG FRACTURES.
AVOID CONSTRICTION IN APPLYING TRACTION.
LEG FRACTURE MAY BE EASILY OVERLOOKED. INSPECT AND PALPATE. IF LEG IS CROOKED IT IS BROKEN. IF THERE IS LOCAL TENDERNESS PRETEND IT IS BROKEN.
DON'T TRY FOR CREPITUS!
IMMOBILIZE KNEE AND ANKLE.
HOLD FOOT AT RIGHT ANGLE TO LEG.
KEEP PATIENTS WARM BEFORE AND DURING TRANSPORTATION.

FRACTURE OF TIBIA AND FIBULA

Transportation

Fractures of the leg bones should be splinted before the patient is transported. "Splint 'em where they lie." Do not remove clothing or shoes. Apply a hitch round the shoe and ankle with a piece of bandage, slip a Thomas leg splint round the leg, and draw the hitch snugly to the end of the splint. The leg is steadied in the splint by cross supports made of bandage or cloth. Keep the patient warm; do not move the bone fragments more than is required to straighten out the leg. Obtain transportation to take the patient to the hospital, where roentgen examination must be made.

NOTES

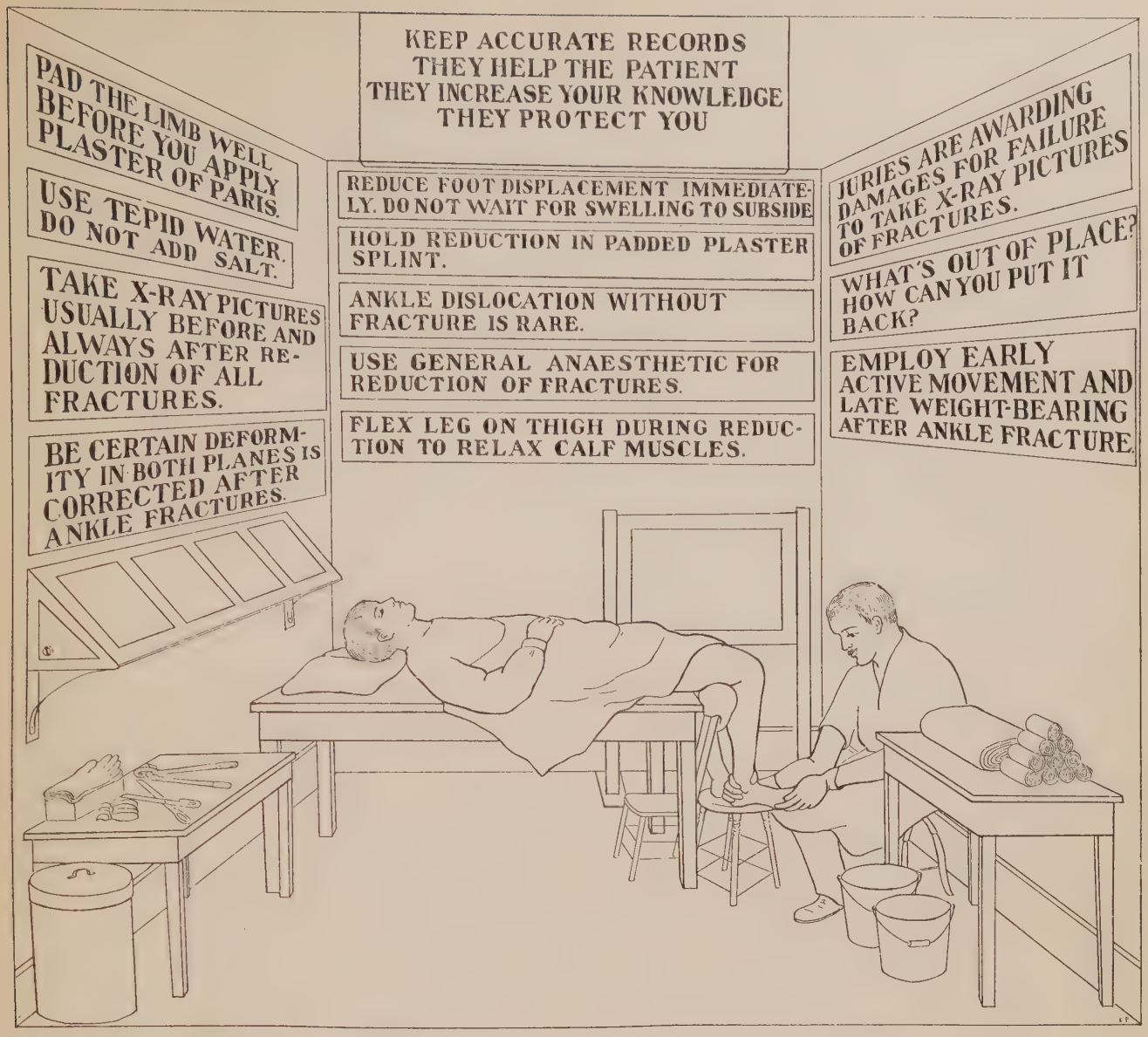

BED TREATMENT
IN
HOME OR HOSPITAL
SPLINTS AND CARE
FOR
BED TREATMENT
METHODS OF REDUCTION AND FIXATION
TRACTION IS THE FORCE WHICH REDUCES FRACTURES OF THE LEG.
TRACTION IS THE FORCE WHICH PREVENTS OVERRIDING OF FRAGMENTS.
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES.
TAKE X-RAY PICTURES USUALLY BEFORE AND ALWAYS AFTER REDUCTION OF ALL FRACTURES.
USE AN ANAESTHETIC FOR EXAMINATION AND REDUCTION.
REDUCE FRACTURE AT ONCE. EARLY EXACT REDUCTION IS ALL IMPORTANT
MATCH THE WELL LEG!
CLEANSE SKIN SURGICALLY AFTER ALL LEG FRACTURES. IN COMPOUND FRACTURES ALSO CLEANSE WOUND AND GIVE A.T.S.
PLASTER OF PARIS SPLINTS WILL GIVE FIXATION. ALWAYS SPLIT THE PLASTER SPLINT.
FOOT-DROP SHOULD BE PREVENTED.
FOOT-DROP IS CAUSED BY
1. NERVE INJURY-VERY RARE.
2. UNSUPPORTED FOOT-VERY COMMON.
ALWAYS ELEVATE FOOT OF BED.
PROTECT THE HEEL FROM PRESSURE
ANT. SUPERIOR SPINE OF ILIUM
MED PATELLA
THROUGH AXIS OF 2ND TOE
THIS IS THE WEIGHT BEARING LINE.
TWO X-RAY VIEWS ARE NECESSARY TO JUDGE THE POSITION OF FRAGMENTS: ANTERO-POSTERIOR AND LATERAL
CHECK WITH X-RAY RESULTS OBTAINED BY SPLINTS OR TRACTION-SUSPENSION METHODS.
DO NOT BE SATISFIED WITH POOR POSITION AND SHORTENING.
EQUAL LEG LENGTH LOWERS LIABILITY.
POOR LEG AXIS LIMITS USE.
LOSS OF LEG LENGTH LIMITS LEG LEVERAGE.
PLASTER SPLINT PRESSURE MAY CAUSE PERONEAL PARALYSIS.

FRACTURE OF TIBIA AND FIBULA

Bed Treatment

Roentgenograph the suspected fracture of the leg bones as soon as the patient reaches the hospital. Cleanse the skin of the leg or, if the fracture is open, prepare to treat the wound surgically. Proceed to reduce the fracture at once under anesthesia and hold the position by a plaster dressing. If continuous traction is required to hold the bone fragments in position, consider the primary use of skeletal traction in suspension. Check the position by roentgen examination and keep the foot at right angles to the leg. Do not attempt to hurry union of leg fractures. Do not make too much traction lest bone fragments may separate. When union is established, delay unsupported weight bearing until the bone is quite firm. If union is slow, adopt ambulatory methods of modified weight bearing in a plaster splint or walking brace.

NOTES


KEEP ACCURATE RECORDS
THEY HELP THE PATIENT
THEY INCREASE YOUR KNOWLEDGE
THEY PROTECT YOU
PAD THE LIMB WELL BEFORE YOU APPLY PLASTER OF PARIS.
USE TEPID WATER. DO NOT ADD SALT.
TAKE X-RAY PICTURES USUALLY BEFORE AND ALWAYS AFTER REDUCTION OF ALL FRACTURES.
BE CERTAIN DEFORMITY IN BOTH PLANES IS CORRECTED AFTER ANKLE FRACTURES.
REDUCE FOOT DISPLACEMENT IMMEDIATELY. DO NOT WAIT FOR SWELLING TO SUBSIDE
HOLD REDUCTION IN PADDED PLASTER SPLINT.
ANKLE DISLOCATION WITHOUT FRACTURE IS RARE.
USE GENERAL ANAESTHETIC FOR REDUCTION OF FRACTURES.
FLEX LEG ON THIGH DURING REDUCTION TO RELAX CALF MUSCLES.
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES.
WHAT'S OUT OF PLACE? HOW CAN YOU PUT IT BACK?
EMPLOY EARLY ACTIVE MOVEMENT AND LATE WEIGHT-BEARING AFTER ANKLE FRACTURE.

FRACTURES ABOUT THE ANKLE JOINT

Varieties.—Fracture at the ankle joint is common and may be of several well recognized varieties. The simplest classification is of four types: (1) eversion fractures, the foot turning outward; (2) inversion fractures, the foot turning inward; (3) anterior lip fracture, the foot displaced forward; (4) posterior lip fracture, the foot displaced backward.

There are many varieties of each type. In some one malleolus is broken, in others both malleoli are broken. Pott's fracture is an eversion fracture with the internal malleolus broken at the level of the ankle joint, and the external malleolus above the joint level. The so-called lip fractures are those in which the anterior lip or the posterior lip of the tibia is broken, allowing the foot to displace itself backward or forward on the tibia. Severe violence often causes extensive and complicated lines of fracture about the ankle.

Both anteroposterior and lateral roentgenograms are necessary and must be carefully studied before attempts at reduction.

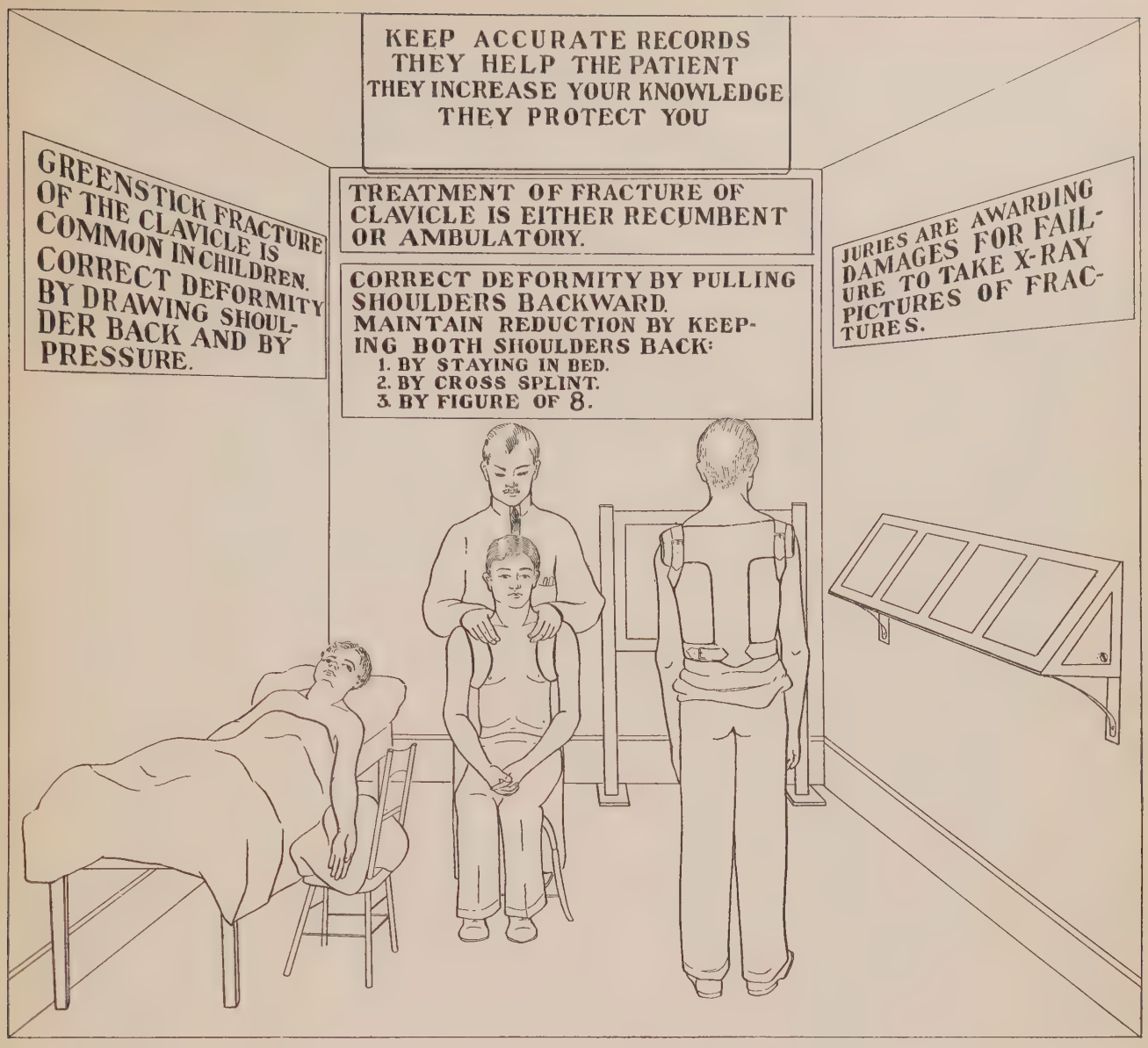
Reduction and Treatment.—Clean the foot and leg with soap, water and alcohol. Anesthetize the patient. Flex the knee; then firmly grasp the foot and leg and gently manipulate to reduce the displacement, keeping an eye on the two roentgenograms. Apply a molded plaster-of-paris splint to the foot and leg in the position of reduction. Be sure the circulation is unrestricted. After seven days, start active movements. In a large proportion of

NOTES

ankle fractures the deformity will recur if weight bearing is allowed too soon. Therefore unprotected walking should not be allowed until solid bony union has occurred, often a matter of from eight to twelve weeks.

When reduction is not secured, open operation may be indicated. After ankle fracture, the principal causes of disability are limitation of dorsal flexion and failure to maintain the normal weight bearing axis.

NOTES


KEEP ACCURATE RECORDS
THEY HELP THE PATIENT
THEY INCREASE YOUR KNOWLEDGE
THEY PROTECT YOU
GREENSTICK FRACTURE OF THE CLAVICLE IS COMMON IN CHILDREN. CORRECT DEFORMITY BY DRAWING SHOULDER BACK AND BY PRESSURE.
TREATMENT OF FRACTURE OF CLAVICLE IS EITHER RECUMBENT OR AMBULATORY.
CORRECT DEFORMITY BY PULLING SHOULDERS BACKWARD.
MAINTAIN REDUCTION BY KEEPING BOTH SHOULDERS BACK:
1. BY STAYING IN BED.
2. BY CROSS SPLINT.
3. BY FIGURE OF 8.
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES.

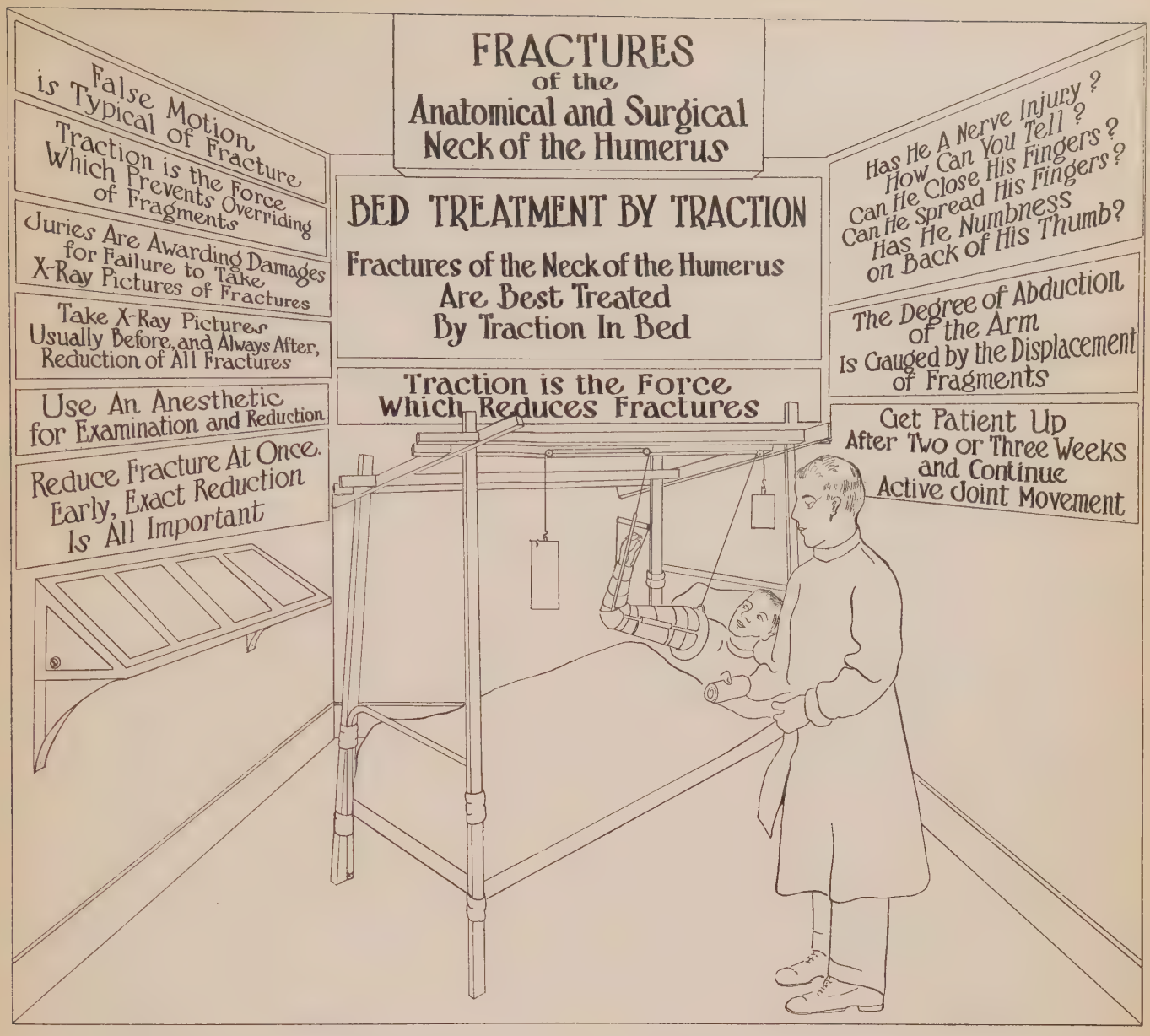
FRACTURE OF THE CLAVICLE

The commonest type of fracture is in the middle third of the bone, which allows the shoulder to fall forward, downward and inward. Palpation of the clavicle will show any overlapping of the fragments. Infants will not use the arm on the injured side and they hold their heads toward the injured shoulder.

Roentgenograms will reveal the fracture and amount of displacement of fragments.

Complete reduction of fragments is difficult, but results after fracture of the clavicle are usually good functionally. The fragments may be best reduced by lying in bed with a pad between the shoulder blades, bringing the injured arm down over the edge of the bed. Next best is the figure of eight bandage, holding the shoulder up and back, or the clavicular T shaped splint. Ambulatory treatment is given by a figure of eight bandage, or the clavicular T shaped splint to hold the shoulders back, to be worn for at least three weeks. During this period, encourage active abduction of the shoulder.

NOTES



FRACTURES OF THE ANATOMICAL AND SURGICAL NECK OF THE HUMERUS

Fracture of the anatomical neck of the humerus is seen most commonly in elderly men and women. It is either impacted or unimpacted. When it is impacted, the treatment consists of the application of a sling to the forearm and immediate active movements of the shoulder, avoiding pain, with heat and gentle massage to the shoulder, arm and forearm. When it is unimpacted, the head fragment or upper fragment may be displaced downward and forward; rarely the head fragment may be dislocated and lie in the axilla. With displacement of the upper fragment, bed treatment is indicated; traction should be used with the arm in abduction and outward rotation to secure reduction. After reduction, the application of traction should continue for about three weeks. Then gentle guided active movements may be allowed. Ambulatory splints are as a rule unsatisfactory. Careful study of roentgenograms taken in two planes is necessary. The question of nerve injury is important.

Fracture of the surgical neck of the humerus includes fractures below the tuberosities of the humerus and in the upper quarter of the humeral shaft. It is a common fracture. It may be oblique or transverse. The upper fragment is abducted and flexed and the lower fragment rides upward toward the axilla. In the presence of marked shortening and overriding, administer a general

NOTES

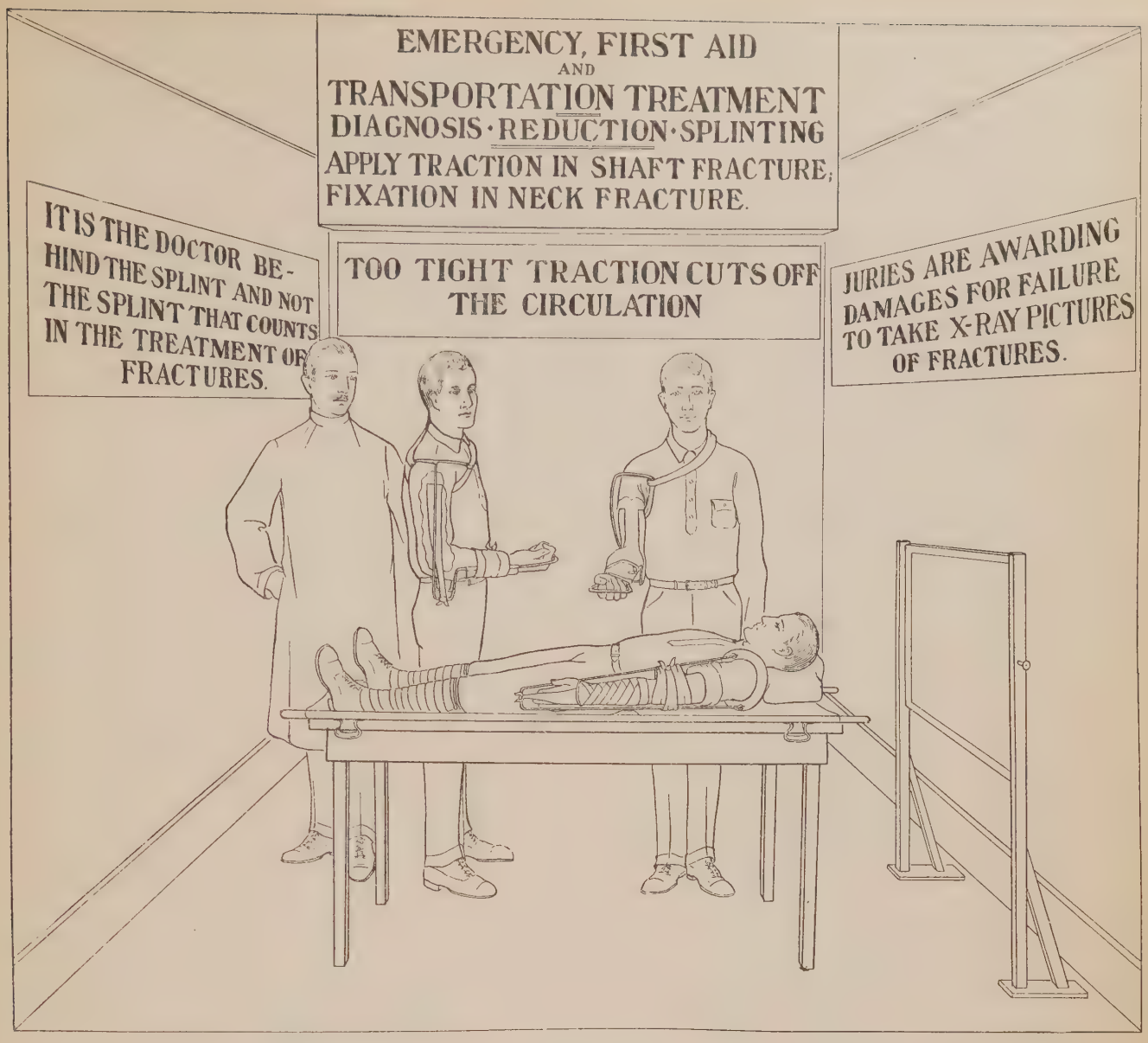
anesthetic and gently manipulate the fragments into approximation, by traction and rotation. Bed treatment with traction steadily applied for from two to three weeks is the best form of treatment. Observe the position of fragments by study of the roentgenograms. After from two to three weeks get the patient up with proper support, such as sling and circular bandage, or Velpeau bandage, using active guided movements of shoulder, elbow and wrist.

Fractures of the surgical neck may be treated by ambulatory apparatus or plaster-of-paris splints.

Do not overlook fracture dislocation.

Do not overlook nerve injury.

NOTES

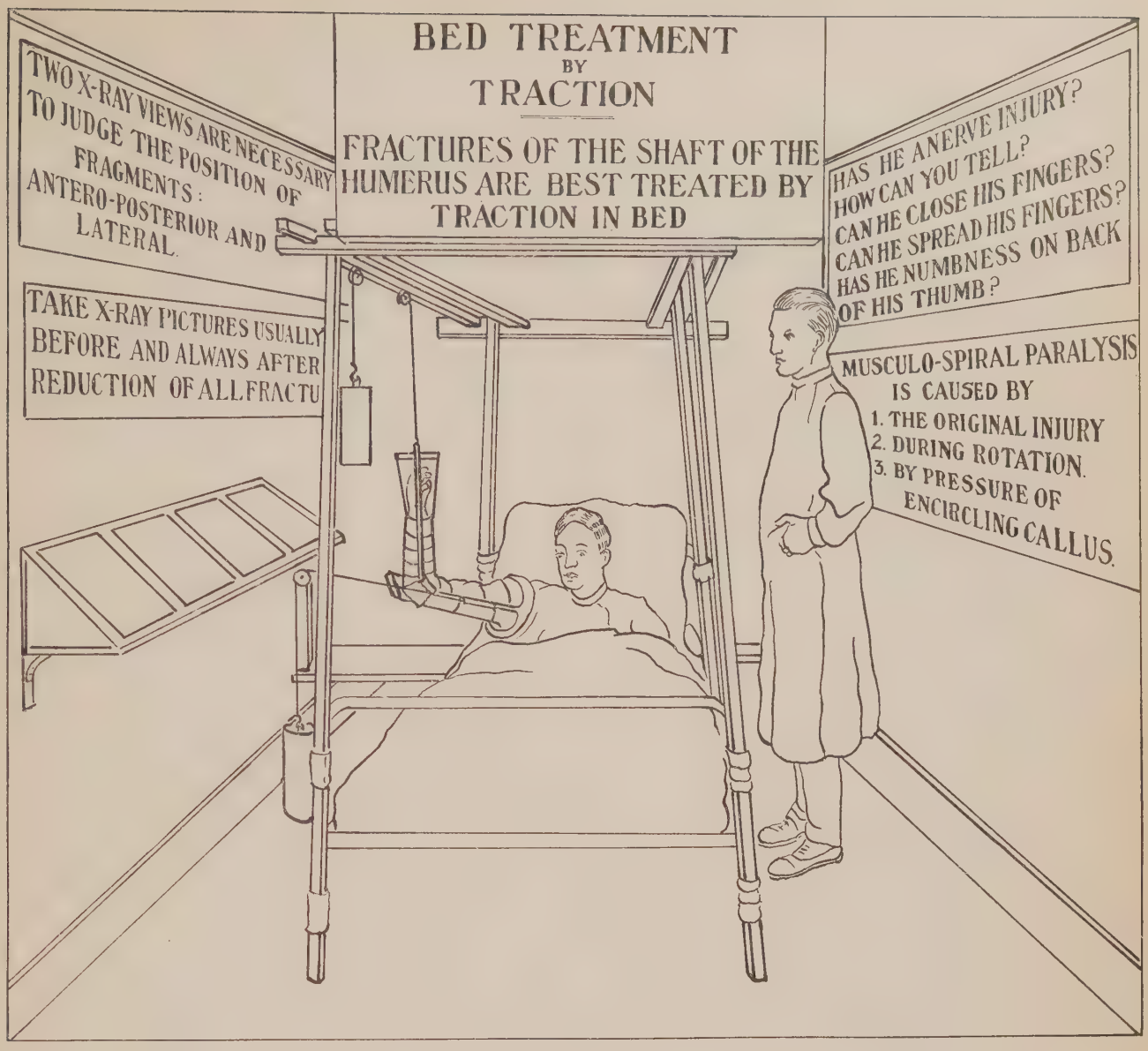

EMERGENCY, FIRST AID
AND
TRANSPORTATION TREATMENT
DIAGNOSIS·REDUCTION·SPLINTING
APPLY TRACTION IN SHAFT FRACTURE;
FIXATION IN NECK FRACTURE.
IT IS THE DOCTOR BEHIND THE SPLINT AND NOT THE SPLINT THAT COUNTS IN THE TREATMENT OF FRACTURES.
TOO TIGHT TRACTION CUTS OFF THE CIRCULATION
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES.

FRACTURE OF THE HUMERUS

Emergency and Transportation Treatment

First treatment for fracture of the shaft of the humerus requires a mild pull on the arm to steady it and prevent overriding of bone fragments. Rip up the patient's sleeve, apply adhesive tape along the sides of the arm, and fasten the arm in a Thomas arm splint or to any long flat surface. The arm is held in the splint by cross slings or a bandage round all. Do not make the traction too tight or circular; that cuts off circulation in the arm. Intelligent use of simple methods is better than any elaborate splint. Get the patient to the office or hospital for roentgen examination and permanent treatment.

NOTES


BED TREATMENT
BY
TRACTION
FRACTURES OF THE SHAFT OF THE HUMERUS ARE BEST TREATED BY TRACTION IN BED
TWO X-RAY VIEWS ARE NECESSARY TO JUDGE THE POSITION OF FRAGMENTS: ANTERO-POSTERIOR AND LATERAL.
TAKE X-RAY PICTURES USUALLY BEFORE AND ALWAYS AFTER REDUCTION OF ALL FRACTU
HAS HE A NERVE INJURY?
HOW CAN YOU TELL?
CAN HE CLOSE HIS FINGERS?
CAN HE SPREAD HIS FINGERS?
HAS HE NUMBNESS ON BACK OF HIS THUMB?
MUSCULO-SPIRAL PARALYSIS IS CAUSED BY
1. THE ORIGINAL INJURY
2. DURING ROTATION.
3. BY PRESSURE OF ENCIRCLING CALLUS.

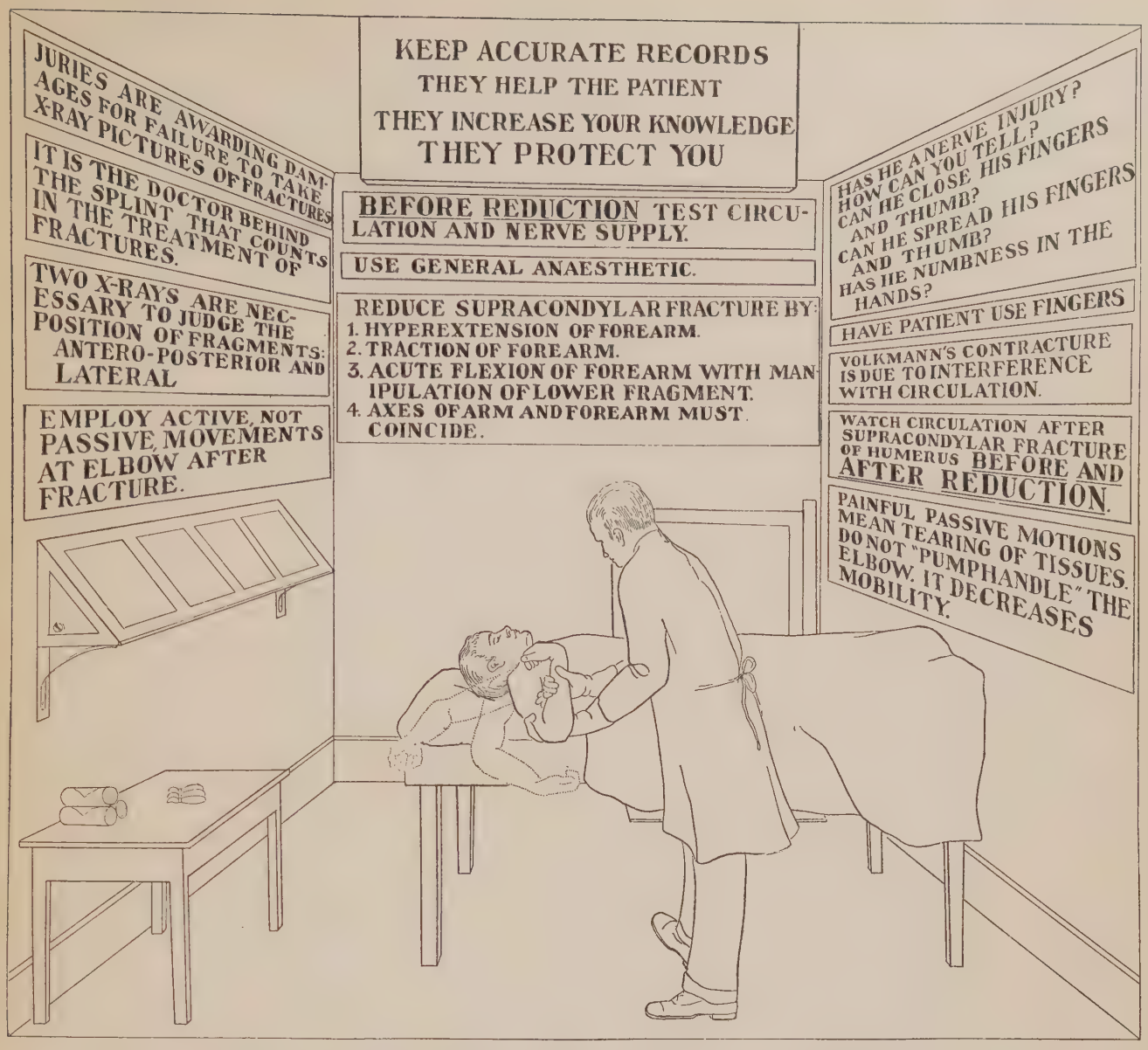
FRACTURE OF THE HUMERUS

Bed Treatment

The accepted treatment of shaft fractures of the humerus is traction on the arm while the patient lies in bed. A diagnosis has been confirmed by roentgen examination. Mild traction on the arm is obtained by adhesive plaster applied to the skin. Suspend the arm in a Thomas arm splint at the proper angle of abduction from the thorax to favor a reduction of fragments. Examine the hand and arm carefully to determine the presence of nerve lesions; record the observations in writing.

The elbow must be flexed after from sixteen to eighteen days. Reduction may also follow application of traction on the flexed forearm and the arm direct. After four weeks the patient may be allowed up to carry the arm in a splint in a sling with splints applied on the arm to steady the main fragments. If straight traction is used, at the end of sixteen days remove the arm from the splint without disturbing the freshly formed callus. Gently flex the elbow, using gas anesthesia if required. Place the arm and the forearm, the latter flexed in supination, in a molded plaster-of-paris splint applied on the posterior surface of the arm from the shoulder to the hand. Keep the arm in this splint until the callus is firm enough to give full bony support.

NOTES


KEEP ACCURATE RECORDS
THEY HELP THE PATIENT
THEY INCREASE YOUR KNOWLEDGE
THEY PROTECT YOU
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES
IT IS THE DOCTOR BEHIND THE SPLINT THAT COUNTS IN THE TREATMENT OF FRACTURES.
TWO X-RAYS ARE NECESSARY TO JUDGE THE POSITION OF FRAGMENTS: ANTERO-POSTERIOR AND LATERAL
EMPLOY ACTIVE, NOT PASSIVE, MOVEMENTS AT ELBOW AFTER FRACTURE.
BEFORE REDUCTION TEST CIRCULATION AND NERVE SUPPLY.
USE GENERAL ANAESTHETIC.
REDUCE SUPRACONDYLAR FRACTURE BY:
1. HYPEREXTENSION OF FOREARM.
2. TRACTION OF FOREARM.
3. ACUTE FLEXION OF FOREARM WITH MANIPULATION OF LOWER FRAGMENT.
4. AXES OF ARM AND FOREARM MUST COINCIDE.
HAS HE A NERVE INJURY?
HOW CAN YOU TELL?
CAN HE CLOSE HIS FINGERS AND THUMB?
CAN HE SPREAD HIS FINGERS AND THUMB?
HAS HE NUMBNESS IN THE HANDS?
HAVE PATIENT USE FINGERS
VOLKMANN'S CONTRACTURE IS DUE TO INTERFERENCE WITH CIRCULATION.
WATCH CIRCULATION AFTER SUPRACONDYLAR FRACTURE OF HUMERUS BEFORE AND AFTER REDUCTION.
PAINFUL PASSIVE MOTIONS MEAN TEARING OF TISSUES. DO NOT "PUMPHANDLE" THE ELBOW. IT DECREASES MOBILITY.

SUPRACONDYLAR FRACTURE OF THE HUMERUS

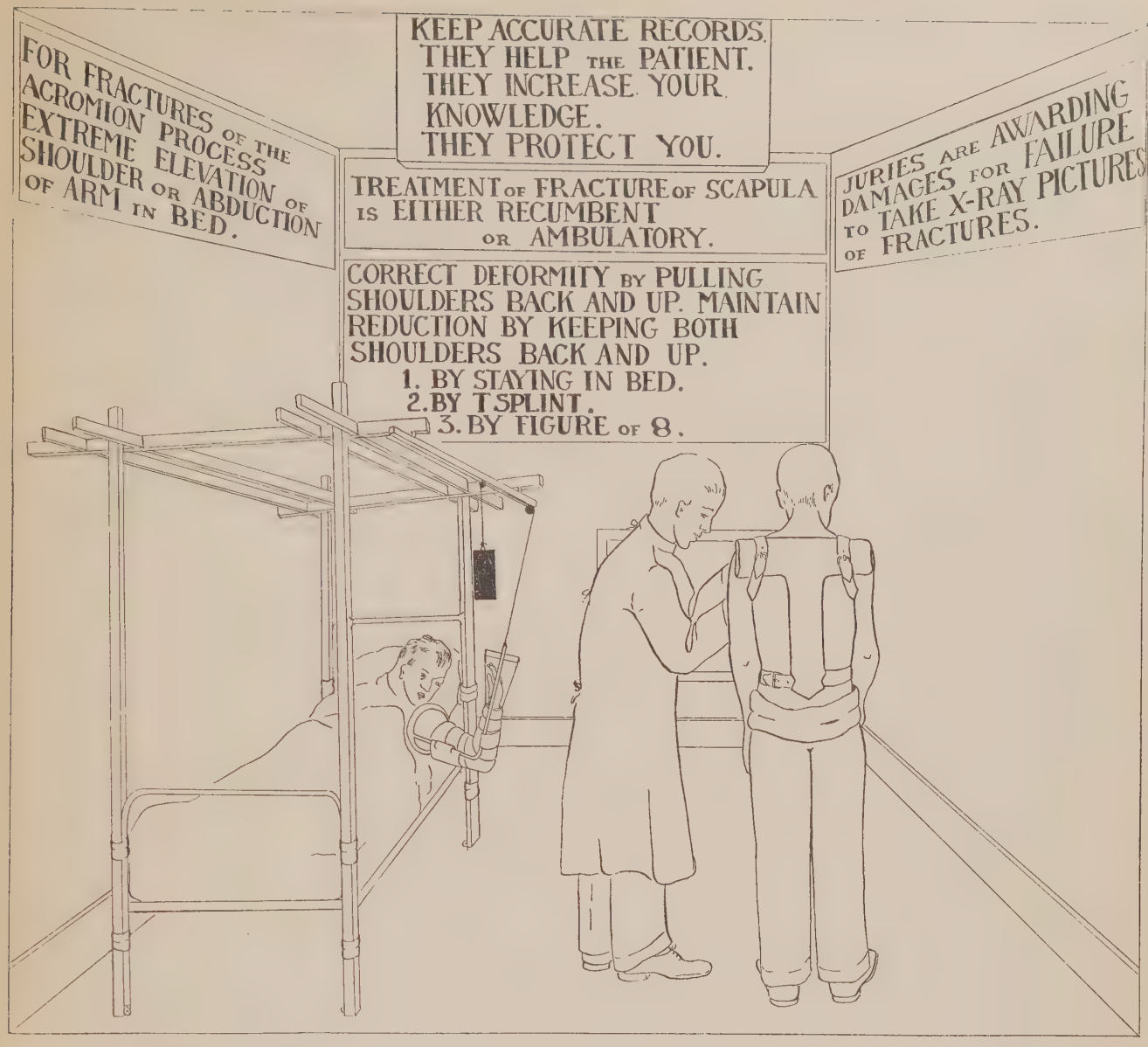
The commonest elbow fracture is the supracondylar. This is more often seen in children than in adults. Early careful reduction of displacement is most important. The main complications are associated nerve and blood vessel injuries and subsequent circulatory interference. Volkmann's ischemic paralysis is more frequently seen after this type of injury than any other.

The usual deformity is due to a dorsal (and often lateral) displacement of the lower fragment. To reduce this displacement anesthetize the patient and grasp the forearm while the arm is steadied by an assistant. With steady traction, first hyperextend the forearm to unlock the fragments. Then slowly flex while the forward pressure is made over the lower fragment and the axis of the arm and forearm are alined over each other. After reduction has been obtained and proved by roentgen examination, maintain it by the flexed position, applying a suitable bandage or splint to the forearm and arm.

Observe the circulation carefully. Any blueness of the fingers, swelling, numbness or decrease in the radial pulse indicate loosening of the dressing and often a lessening of the flexion of the forearm.

Early active movements under the physician's personal supervision should be encouraged after supracondylar fractures. Do not believe that you can work motion back into these elbows by forcible passive movements. Let the child alone; he will gradually increase his elbow motion unless there is some good reason. Old unreduced supracondylar fractures may require open operations.

NOTES

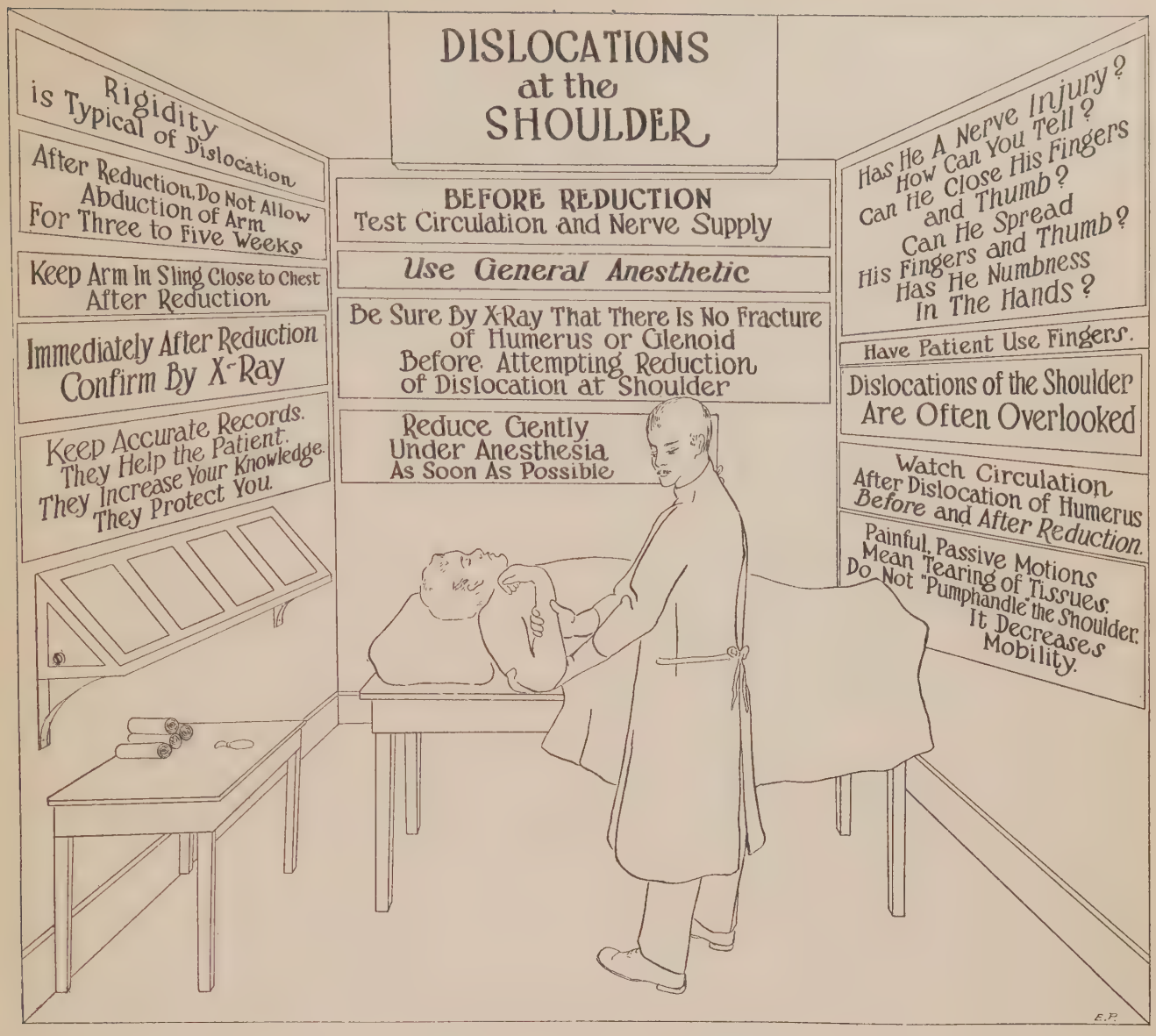

KEEP ACCURATE RECORDS.
THEY HELP THE PATIENT.
THEY INCREASE YOUR KNOWLEDGE.
THEY PROTECT YOU.
FOR FRACTURES OF THE ACROMION PROCESS EXTREME ELEVATION OF SHOULDER OR ABDUCTION OF ARM IN BED.
TREATMENT OF FRACTURE OF SCAPULA IS EITHER RECUMBENT OR AMBULATORY.
CORRECT DEFORMITY BY PULLING SHOULDERS BACK AND UP. MAINTAIN REDUCTION BY KEEPING BOTH SHOULDERS BACK AND UP.
1. BY STAYING IN BED.
2. BY T SPLINT.
3. BY FIGURE OF 8.
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES.

FRACTURE OF THE SCAPULA

Fracture of the scapula is rare and is due to great violence. This flat bone is well protected by muscles. It is fractured in about 0.7 per cent of all fractures. The scapula may be broken as follows: body, spine, acromion, coronoid, glenoid, neck and angles. Fractures of the neck and of the glenoid are serious injuries.

Treatment may be recumbent or ambulatory. The arms and the forearm must be supported. The shoulder must be held up and back. Rest in bed with light traction, the arm being in abduction with the elbow flexed to right angles, keeping the shoulder high and back is the best treatment. A clavicular T splint with shoulder straps or a figure of eight shoulder dressing are the best for ambulatory treatment.

NOTES



DISLOCATIONS AT THE SHOULDER

Subcoracoid dislocation of the humeral head is the common dislocation of the shoulder.

Signs.—The elbow stands out from the body. The injured arm is supported by the opposite hand. The hand on the injured side cannot be placed on the opposite shoulder. The patient leans toward the affected side. The anterior axillary fold is lower on the dislocated side, and the long axis of the humerus points more obliquely inward than on the opposite side. The outer aspect of the shoulder is flattened. The deltoid muscle is tightly stretched over the acromion. Palpation will show the head of the humerus anterior. The head will move with the shaft. The arm measures longer than on the normal side.

What to do.—When dislocation is suspected, get satisfactory roentgenograms before doing anything, because fracture must be ruled out. Fracture with dislocation is not uncommon.

Reduce the Dislocation.—If Kocher's method is used gently and slowly, it will reduce most uncomplicated cases.

1. The patient lies on the table on his back, fully anesthetized. Stand on the injured side. Grasp the patient's elbow firmly with one hand, the other holding the patient's wrist, with the forearm flexed to a right angle. Maintain steady strong traction and slowly and gently rotate the arm outward; then raise the elbow forward. These movements stretch the subscapular and pectoral muscles and open the tear in the capsule. (The head of

NOTES

the humerus rides up on the glenoid rim and may slip in quickly.)

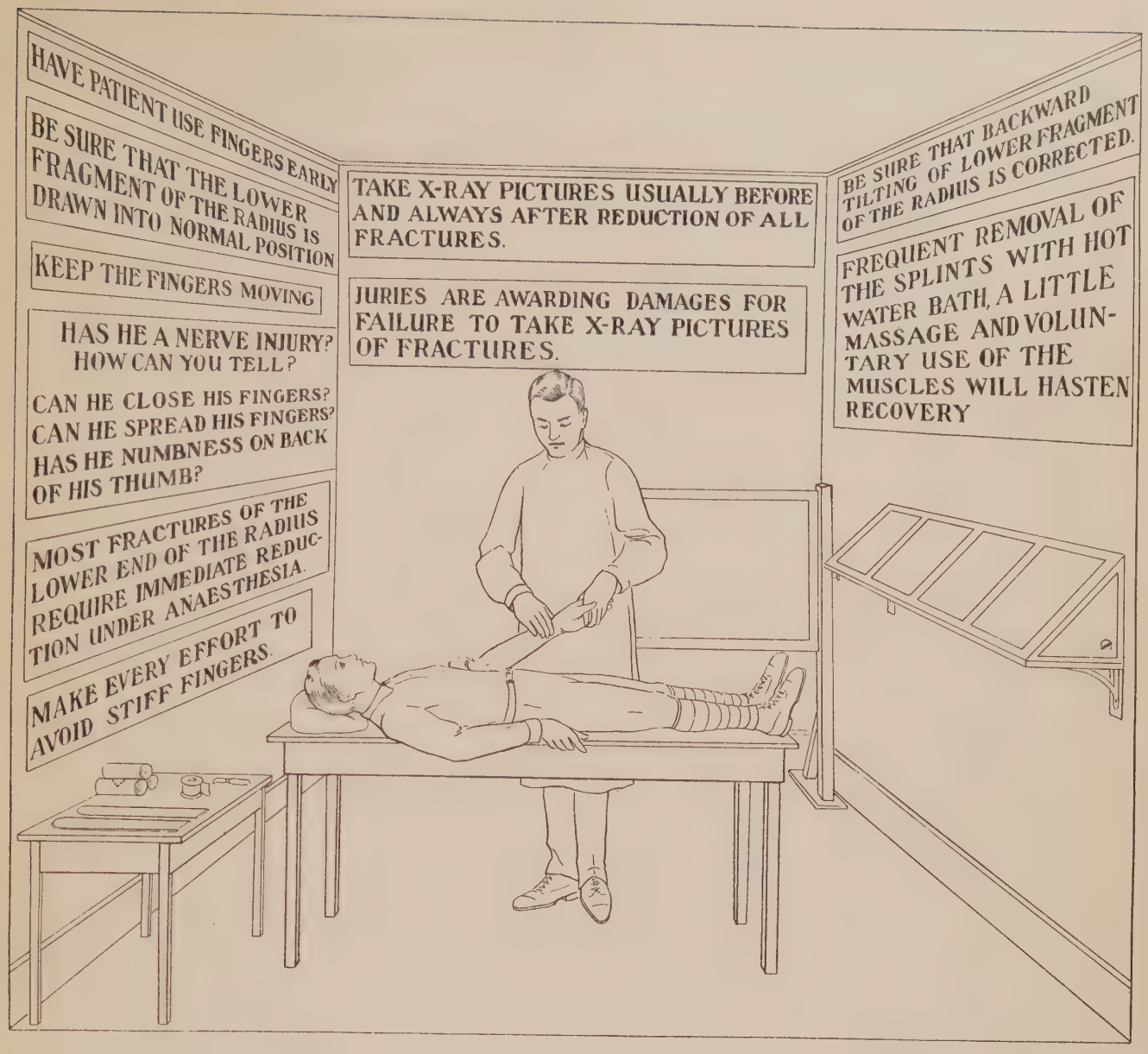
2. The patient's elbow and arm are raised up and across the patient's chest, so that the elbow approaches the nipple on the opposite side.

3. Then rotate the arm inward by sweeping the forearm across the patient's face to bring the arm to a normal position on the patient's side. After reduction, the arm must be held in a sling or Velpeau dressing. Activity is allowed gradually and increased with active movement and massage abduction being avoided.

Unreduced dislocations result in great disability. Unreduced old dislocations result in loss of function and stiff shoulders and require open operation.

Do not overlook the possibility of fracture associated with dislocation. Do not fracture the humerus in the attempt at reduction. Be gentle and systematic.

NOTES


HAVE PATIENT USE FINGERS EARLY
BE SURE THAT THE LOWER FRAGMENT OF THE RADIUS IS DRAWN INTO NORMAL POSITION
KEEP THE FINGERS MOVING
HAS HE A NERVE INJURY? HOW CAN YOU TELL?
CAN HE CLOSE HIS FINGERS?
CAN HE SPREAD HIS FINGERS?
HAS HE NUMBNESS ON BACK OF HIS THUMB?
MOST FRACTURES OF THE LOWER END OF THE RADIUS REQUIRE IMMEDIATE REDUCTION UNDER ANAESTHESIA.
MAKE EVERY EFFORT TO AVOID STIFF FINGERS.
TAKE X-RAY PICTURES USUALLY BEFORE AND ALWAYS AFTER REDUCTION OF ALL FRACTURES.
JURIES ARE AWARDING DAMAGES FOR FAILURE TO TAKE X-RAY PICTURES OF FRACTURES.
BE SURE THAT BACKWARD TILTING OF LOWER FRAGMENT OF THE RADIUS IS CORRECTED.
FREQUENT REMOVAL OF THE SPLINTS WITH HOT WATER BATH, A LITTLE MASSAGE AND VOLUNTARY USE OF THE MUSCLES WILL HASTEN RECOVERY

FRACTURE OF RADIUS

Lower End

Reduce fractures of the lower end of the radius under anesthesia as soon as possible. To correct the usual backward tilting of the lower fragment, increase the silver fork deformity by bending the hand back; pull down on the hand and then flex it while under traction. Be satisfied that the silver fork deformity has gone and that normal relations of the styloid processes of the radius and ulna are restored. Compare with the uninjured wrist. Splint with molded plaster-of-paris or padded wooden splints in reduced position. Check reduction by roentgen examination in two planes, anteroposterior and lateral.

After three days, remove the splints; do not disturb the bone; apply heat and gentle massage. After twelve days, active use of the hand may be started, the fingers having been moved all the time during healing of the fracture. When comminution exists, immobilization must be maintained for from twelve to eighteen days.

NOTES

SPLINTS FOR THE DOCTOR'S AUTOMOBILE

1 Thomas leg splint
1 Thomas arm splint.
½ dozen bass wood splints.
Enough sheet wadding or cotton (padding).
1 turniquet.
1 can of ether.
Bandages.
Adhesive tape.

SPLINTS FOR THE DOCTOR'S OFFICE

2 Thomas leg splints.
1 Thomas arm splint.
1 dozen splint boards of bass wood ⅛ by 3 by 24.
2 dozen plaster-of-paris bandages wrapped in paper napkins, kept in an air tight tin box in a dry place.
2 dozen sheet wadding rolls 4 inches wide, 5 yards long, or non-absorbent cotton.
1 yard of saddler's felt, one-half inch thick.
½ dozen wire gauze rolls, 4 inches by 2 yards; chicken wire, one-fourth inch mesh.
1 dozen iron wire rods, one-eighth inch, 1 yard long.
1 roll of copper wire, 16 gage.
3 rolls of zinc oxide adhesive plaster 5 yards long and 2 inches wide.
6 sand bags made of heavy canvas 9 by 1 or 2 inches.
Rubber tubing, one-half inch; several long pieces for a tourniquet.
2 dozen webbing straps and buckles, 2 feet long.
2 dozen 1 to 3 inch roller bandages.

Miscellaneous

Screw eyes, pulleys, cord rope, weights or bags for sand, screw driver, saw, wire pliers, monkey wrench, gimlet and hammer.